F593
.R4
1860
v.12
pt.1

36th Congress, 1st Session. } HOUSE OF REPRESENTATIVES. { Ex. Doc. No. 56.

U.S.

REPORTS

OF

EXPLORATIONS AND SURVEYS,

TO

ASCERTAIN THE MOST PRACTICABLE AND ECONOMICAL ROUTE FOR A RAILROAD

FROM THE

MISSISSIPPI RIVER TO THE PACIFIC OCEAN.

MADE UNDER THE DIRECTION OF THE SECRETARY OF WAR, IN

1853-5,

ACCORDING TO ACTS OF CONGRESS OF MARCH 3, 1853, MAY 31, 1854, AND AUGUST 5, 1854.

VOLUME XII.
BOOK I.

Mo. Bot. Garden
1909

WASHINGTON:
THOMAS H. FORD, PRINTER
1860.

IN THE HOUSE OF REPRESENTATIVES—February 14, 1855.

Resolved, That there be printed, for the use of the House, ten thousand copies of the reports of surveys for a railroad to the Pacific, made under the direction of the Secretary of War, embracing the report of F. W. Lander, civil engineer, of a survey of a railroad route from Puget's Sound, by Fort Hall and the Great Salt lake, to the Mississippi river; and the report of J. C. Frémont, of a route for a railroad from the head-waters of the Arkansas river into the State of California; together with the maps and plates accompanying each of said reports necessary to illustrate them.

Attest:

J. W. FORNEY,

Clerk of the House of Representatives of the United States.

THIRTY-SECOND CONGRESS, SECOND SESSION—Chapter 98.

Sect. 10. *And be it further enacted*, That the Secretary of War be, and he is hereby, authorized, under the direction of the President of the United States, to employ such portion of the Corps of Topographical Engineers, and such other persons as he may deem necessary, to make such explorations and surveys as he may deem advisable, to ascertain the most practicable and economical route for a railroad from the Mississippi river to the Pacific ocean; and that the sum of one hundred and fifty thousand dollars, or so much thereof as may be necessary, be, and the same is hereby, appropriated, out of any money in the treasury not otherwise appropriated, to defray the expense of such explorations and surveys.

Approved March 3, 1853.

THIRTY-THIRD CONGRESS, FIRST SESSION—Chapter 60.

Appropriation: For deficiencies for the railroad surveys between the Mississippi river and the Pacific ocean, forty thousand dollars.

Approved May 31, 1854.

THIRTY-THIRD CONGRESS, FIRST SESSION—Chapter 267.

Appropriation: For continuing the explorations and surveys to ascertain the best route for a railway to the Pacific, and for completing the reports of surveys already made, the sum of one hundred and fifty thousand dollars.

Approved August 5, 1854.

IN THE HOUSE OF REPRESENTATIVES—March 25, 1860.

Resolved, That there be printed, for the use of this House, ten thousand extra copies, in addition to the usual number, of Governor Stevens's final report of the exploration and survey of the northern route for a Pacific railroad.

CONTENTS OF VOLUME XII.—BOOK I.

PART I AND THE APPENDICES OF THE NARRATIVE AND FINAL REPORT BY ISAAC I. STEVENS, GOVERNOR OF WASHINGTON TERRITORY, UPON THE ROUTE NEAR THE FORTY-SEVENTH AND FORTY-NINTH PARALLELS.

EXPLORATIONS AND SURVEYS FOR A RAILROAD ROUTE FROM THE MISSISSIPPI RIVER TO THE PACIFIC OCEAN
WAR DEPARTMENT.

NARRATIVE

AND

FINAL REPORT

OF

EXPLORATIONS FOR A ROUTE FOR A PACIFIC RAILROAD,

NEAR

THE FORTY-SEVENTH AND FORTY-NINTH PARALLELS OF NORTH LATITUDE,

FROM

ST. PAUL TO PUGET SOUND.

BY

ISAAC I. STEVENS,
GOVERNOR OF WASHINGTON TERRITORY.

1855.

LETTER TO THE SECRETARY OF WAR.

WASHINGTON CITY, D. C., *February* 7, 1859.

SIR: I have the honor to submit my final report of the explorations made by me and under my direction, in the years 1853, 1854, and 1855, to determine the practicability of the northern route for a railroad to the Pacific.

I am, very respectfully, your most obedient,

ISAAC I. STEVENS.

HON. JOHN B. FLOYD,
Secretary of War, Washington City.

GENERAL TABLE OF CONTENTS.

INTRODUCTION.

PART I.

GENERAL REPORT.

PART II.

BOTANICAL REPORT:

No. 1.—Report upon the Botany of the Route. By J. G. Cooper, M. D.
No. 2.—Catalogue of Plants collected east of the Rocky Mountains. By Prof. Asa Gray.
No. 3.—Catalogue of Plants collected in Washington Territory. By J. G. Cooper, M. D.

PART III.

ZOOLOGICAL REPORT:

No. 1.—Report upon Insects collected on the Survey. By John L. Leconte, M. D.
No. 2.—Report upon the Mammals collected on the Survey. By J. G. Cooper, M. D., and Dr. Suckley, U. S. A.
No. 3.—Report upon the Birds collected on the Survey. By J. G. Cooper, M. D., and Dr. Suckley, U. S. A.
No. 4.—Report upon the Reptiles collected on the Survey. By J. G. Cooper, M. D.
No. 5.—Report upon the Fishes collected on the Survey. By Dr. G. Suckley, U. S. A.
No. 6.—Report upon the Mollusca collected on the Survey. By Wm. Cooper.
No. 7.—Report upon the Crustacea collected on the Survey. By J. G. Cooper, M. D.

APPENDICES.

APPENDIX A.

TABLE OF HEIGHTS AND DISTANCES.

APPENDIX B.

METEOROLOGICAL REGISTER.

INTRODUCTION.

INTRODUCTION.

THIS report, although much delayed in point of time, follows naturally my preliminary report of 1854, and, in connexion with it, is essential to a full exposition of the subject. When that report was made, the parties of Lieutenant Mullan and Mr. James Doty were still in the field. It was expected that, in the discharge of my duties as a commissioner to make treaties with the Indians, there would be great facilities for extending the field of observation and of reviewing the difficult portions of the route. The preliminary report simply gave the conclusions which had been reached, accompanied by such reports of the officers of the exploration as gave the results of personal observation. On my return to Washington Territory, in the fall of 1854, I met, at Olympia, both Lieutenant Mullan and Mr. James Doty, who had preceded me to that point only a few days. Their reports, forwarded by me to the War Department, were in season to be published in the first volume, but occupied at that time with my duties in negotiating treaties with the Indian tribes, I could do little more than simply forward them. These duties occupied my entire time throughout the year 1855. They required, on my part, not simply visiting very extensively different portions of the Territory, but the exhausting of every possible means of information in regard to its geography and physical characteristics. Copious and accurate information was derived from the Indians themselves. It was my invariable custom, whenever I assembled a tribe in council, to procure from them their own rude sketches of their country, and a map was invariably prepared on a large scale and shown to them, exhibiting not only the region occupied by them, but the reservations which were proposed to be secured to them. At the Blackfoot council the map there exhibited of the Blackfoot country, of the hunting ground common to the Blackfeet and the Assinaboines, of the hunting ground common to the Blackfeet and the tribes of Washington Territory, and of the passes of the Rocky mountains, by which this hunting ground was reached, was the effective agent in guaranteeing to those Indians the exact facts as to what the treaty did provide, and to give them absolute and entire confidence in the government. Thus these treaty operations taking me into nearly all portions of the Territory, and finally bringing me to the waters of the Missouri, where I remained some three months, enabled me thoroughly to re-examine the mountain portion of the railroad route and to extend very largely my general knowledge of the country. When I left Fort Benton, on my way hence, in November, 1855, I expected to devote the following year to my final report; instead of which, however, as is well known to the country, my whole energies and activity were exerted in conducting affairs through Indian wars and difficulties of the most serious character, not, however, to the prejudice of the information previously gained. The operations of the Washington forces on Puget Sound and the interior, accompanied, as these troops always were, by one or two staff officers experienced in exploration, contributed very materially to increase our knowledge of the country. Thus was I occupied, either in managing affairs during a time of war, or bringing affairs into proper condition at the conclusion of war, until the end of my term of office. I came to Washington in the fall of 1857 as the delegate of the Territory, with the materials

to complete the final report contemplated in the first volume, and at all my leisure moments I was industriously occupied in preparing the report. This report was in readiness for Congress before the close of its last session.

In its preparation I beg leave to make my acknowledgements to Dr. J. G. Cooper, who prepared the tables of my paper on meteorology; Professor W. P. Trowbridge, of the United States Coast Survey, who condensed, from the archives of that survey, the paper of Mr. Kohl on the hydrography of Puget Sound; and to both Dr. Cooper and my clerk, Mr. W. W. Johnson, who rendered valuable assistance in condensing and preparing the record matter of the journals. In submitting this report, therefore, at this late date, I feel that I have not been remiss in the discharge of any duty in connexion therewith, and that the delay has tended rather to increase the value of the work by increasing my opportunities of information and judgment.

ISAAC I. STEVENS.

WASHINGTON CITY, *May*, 1860.

PART I.

EXPLORATIONS AND SURVEYS FOR A RAILROAD ROUTE FROM THE MISSISSIPPI RIVER TO THE PACIFIC OCEAN.

WAR DEPARTMENT.

ROUTE NEAR FORTY-SEVENTH AND FORTY-NINTH PARALLELS, EXPLORED BY ISAAC I. STEVENS, GOVERNOR OF WASHINGTON TERRITORY, IN 1853-'5.

GENERAL REPORT.

WASHINGTON, D. C.
1860.

CONTENTS.

NARRATIVE OF 1853.

CHAPTER I.

Saint Paul to Pike Lake.

Proposed railroad route from the Upper Mississippi to Puget Sound.—General Instructions.—The Exploration organized in two Divisions.—Eastern Division under the immediate direction of Governor Isaac I. Stevens.—Western Division under Captain Geo. B. McClellan.—His Instructions.—Lieutenant J. K. Duncan and Dr J. G. Cooper, attached to Western Division, sent to the Columbia River.—Lieutenant Saxton sent to the Columbia Valley.—His Instructions.—Preparatory measures.—Compilation of a Map on a large scale.—Lieutenant Donelson sent to Montreal.—Mathematical Instruments.—Organization of the Eastern Division.—Lieutenant Donelson sent to survey the Missouri.—Messrs. Tinkham and Lander to examine crossings of the Mississippi.—Captain Gardiner to select escort.—Lieutenant Du Barry to secure guides at Pembina.—Governor Stevens leaves Washington City.—His authority to make Treaties with certain Indian Tribes.—Arrives at St. Louis.—Mr. Stanley.—Quartermaster's arrangements not completed.—Fur Company's boat leaves St. Louis.—Instructions to Dr. Evans.—To Mr. Culbertson.—Governor Stevens leaves St. Louis.—Aurora Borealis.—Arrives at St. Paul.—Scenery.—Camp at Lake Amelia.—Breaking in of mules.—Good locations for railroad bridges.—Orders to Lieutenant Du Barry countermanded.—Mr. Dahl proceeds to Pembina.—Mr. Lander to Sauk Rapids.—Instructions.—Accident.—Mr. Tinkham's party.—Meteorological and Astronomical Observations.—Captain Gardiner relieved from duty on account of ill health.—Simpson's party.—Laughing Water Cascade.—Scenery below the Falls.—The command sent forward in three parties, under Lieutenant Grover, Lieutenant Du Barry, and Mr. Everett.—Governor Stevens at St. Anthony.—Large encampment of Winnebagoes.—Description of the country.—Mississippi River.—Canadian voyageurs.—Governor Stevens at Lieutenant Grover's camp.—At Mr. Lander's.—Cold Spring River.—Camp Davis.—Lieutenant Grover's route from St. Anthony.—Arrival of Lieutenant Du Barry and Messrs. Doty and Simpson.—Messrs. Kendall and Osgood reach camp with barometers and India-rubber boats.—Mr. Everett.—Bad condition of animals.—Reading of camp regulations.—Address of Governor Stevens.—His views cordially approved.—Lieutenant Grover despatched to White Bear Lake.—His Instructions.—Mr. Tinkham applies for more voyageurs.—Dr. Suckley's party.—His Instructions.—Order issued by Governor Stevens.—Pembina carts.—Organization of the whole camp.—Paul Boulieau.—Scientific corps.—Lieutenant Du Barry, executive officer.—His instructions.—The train.—Description of the country from Camp Davis to Cold Spring.—Sauk River.—India-rubber boats.—Lake Henry.—Mr. Tinkham at Lightning Lake.—Deep Slough.—Crow-Wing River.—A cool spring.—Series of small lakes.—Lake Ramsey.—Lightning Lake.—Meeting of Lieutenant Grover, Mr. Lander, and Mr. Tinkham near White Bear Lake.—Lieutenant Du Barry relieved from duty.—Ordered to report to the Adjutant General.—Mr. Kendall accompanies him to Long Prairie.—Captain Remenyi and Mr. Jekelfaluzy discharged.—Baggage weighed, and loads distributed.—Governor Stevens pushes forward with Dr. Suckley and the scientific corps.—Lake Stanley.—Arrival at White Bear Lake.—Description of the country from Lightning Lake to White Bear Lake.—Lambert River.—Governor Stevens joins Messrs. Grover, Lander, and Tinkmam at Pike Lake.—Pike Lake, the real starting point of the exploration.—Camp Marcy.

CHAPTER II.

Pike Lake to the Grand Côteau du Missouri.

Lieut. Grover directed to follow Dead Colt Hillock line.—Messrs. Lander and Tinknam sent to Chippewa River.—Abundance of game.—A strike prevented.—Instructions to Lieut. Grover to connect his line with Lieut. Donelson's survey of the Missouri.—Rendezvous appointed at Yellowstone.—Main party follows the Red River Trail.—Crossing of the Chippewa.—Lander and Tinkham sent to Pomme de Terre River.—Approach to Indian Country.—Mr. Moffett.—Anecdote.—Elbow Lake.—Rabbit River.—Severe Thunder-storm.—Bois de Sioux.—Mr. Lambert sent to Red River.—Mr. Doty

to Rabbit River.—Catfish.—Bois de Sioux, commencement of Buffalo Country.—General Review of the Country from St. Paul —Description of Ridge dividing Mississippi and Red Rivers.—Prairie.—Crossing of the Bois de Sioux.—Excessive Heat.—Elks.—Bridging of Wild Rice River.—Severe Storm.—Arrival of Supplies and Indian Ponies.—Governor Stevens and the Engineers push forward to the Shyenne.—Train of Red River Traders.—Visit to their Camp.—Crossing of the Shyenne.—Camp McClelland.—Singular mistake.—Maple River.—Fourth of July.—Signs of Buffaloes.—Antelopes.—Wolves.—Horse Butte and Butte Micheau.—Examination of the Shyenne.—Magnetic Tent.—Camp Guthrie.—Gullies.—Grasshoppers.—Results of Astronomical and Magnetic Observations.—Illness of Governor Stevens.—Issue of Flour reduced.—Return of Mr. Tinkham from Butte Micheau and Lake Jessie.—False Alarm.—Immense herds of Buffaloes.—The dog Jack.—Lake Jessie.—Course determined.—Running according to the Compass.—Mr. Tinkham ordered to reconnoitre the Country between the Shyenne and Jacques Rivers.—Governor Stevens disabled.—James River.—Anxiety for the safety of Mr. Tinkham.—Howitzer fired.—Scouts sent out.—Water brackish.—Mosquitos.—Astronomical Observations.—Doctor Suckley's labors.—Scouts report the approach of Sioux Indians.—Alarm.—Red River Hunters.—News of Tinkham's safety.—Encampment of Red River Hunters.—Chippewa Indians —Governor Wilkie.—Le Bombard engaged as guide.—Butte de Morale.—Origin of the name.—White Wood Lakes —Maison du Chien.—Tributary of Mouse River.—Snipes.—Approach to Côteau du Missouri.—Train of Red River Hunters.—Visit —Governor De l'Orme.—Report of Messrs. Tinkham and Moffett.

CHAPTER III.

The Côteau du Missouri to Fort Union.

Departure of Governor De l'Orme.—Tinkham and Boulieau sent to Mouse River and the River of the Lakes.—Le Bombard prepares map and itinerary.—Mr. Osgood starts for Fort Union.—Instructions sent to Lieutenant Grover.—To Lieutenant Donelson —Letter from Mr. Osgood.—Encampment of Assinaboine Indians.—Blue Thunder and Little Thunder.—The Pipe of Peace.—Address of an Old Chief.—Reply of Governor Stevens —Speech of the Old Brave.—Vaccination.—Origin of the word Assinaboine.—Mr. Lander sent out to the Pierced Rocks.—Mr. Burr in charge of the Barometrical, Dr. Suckley of the Geological Observations.—Boulieau and Le Frambois remain in the Assinaboine camp to collect statistics and prepare a vocabulary.—White Earth River.—Le Bombard sent to Fort Union.—His return.—In sight of Fort Union.—Lieutenants Grover and Donelson meet the party.—Arrival at Fort Union.—Good condition of the animals —Lieutenant Grover's route.—Leaves Pike Lake.—Crosses two forks of the Chippewa River.—The Pomme de Terre.—Description of country from Pike Lake to Lake Traverse.—Lake Traverse.—Rabbit River.—Bois de Sioux.—Wild Rice Biver.—Lightning's Nest —Jacques or James river.—The Grand Côteau.—The two Terraces.—Shyenne River.—Reaches Fort Union.—Lieutenant Donelson's route.—Survey of the Missouri.—Steamboat Robert Campbell.—Plan of making the survey.—Hourly soundings.—Omissions supplied from preceding surveys.—Loss of part of his notes —Description of the Missouri from Saint Louis to mouth of the Kansas —Soil.—Velocity of river.—Sand bars.—Snags.—Sawyers.—Permanent obstructions.—From the Kansas to mouth of the Platte.—Its banks.—Width and velocity.—Its tortuous course at Saint Joseph.—From the Platte to Fort Pierre.—The banks fertile as far as L'Eau Qui Court.—Shoals and rapids.—Dangerous for navigation.—From Fort Pierre to White Earth River.—Exceedingly tortuous course.—Snags and bars.—Cedars.—Width at Fort Union.—Its banks at Fort Clark and Fort Berthold —Picturesque appearance at the Bluffs.—Return of the Robert Campbell.—Exploration of the country north of Fort Union.—General review of the route.—From Saint Paul to Fort Union.—Rate of travel.—Limestone abundant.—Indications of the presence of iron.—Terraces and ridges.—Ponds and marshes.—Dividing Côteau.—Second crossing of the Shyenne.—James River.—Lake Jessie and other Salt Lakes —Mouse River and its valley.—Rivière des Lacs.—The Grand Côteau.—Its general elevation.—Plateau between the Missouri and Red Rivers.—Vegetation scanty.—Wild turnips.—Despatch and presents sent from Fort Union to the Blackfeet.—Their answer to Mr. Culbertson.—Fort Union.—Its situation and history.—Mechanics at the Fort.—Mr. Culbertson and his wife.—Preparations for the continuation of the survey.—Zealous co-operation of Fur Company.—Mr. Lander reaches Fort Union.—Disposition of the party.—Spread of bugbear stories.—Presents to the Assinaboines.—Arrival of the steamer Saint Ange from Saint Louis.—Mr. Everett sent to Washington.—His return a matter of necessity.—Lieutenant Donelson starts towards Cypress Mountain.—Lieutenant Grover continues the usual Wagon Road to Fort Benton.—Governor Stevens leaves a letter for Doctor Evans, not yet returned from the Mauvaises Terres.

CHAPTER IV.

Fort Union to Fort Benton.

Governor Stevens leaves Fort Union.—War Party of Blackfeet.—Camp on Little Muddy Creek.—Council with Blackfeet.—Mrs. Culbertson.—Arrival of Lieutenant Grover.—Programme changed.—Reorganization of the Party.—Conversation with the White Man's Horse.—Express sent to Fort Benton.—Description of country between Fort Union and Big Muddy River.—Remarkable Sandstone formation.—Poplar River.—Meteorological Observations.—Numerous villages of Prairie Dogs.—Porcupine and Milk Rivers.—Valley of Milk River.—Camp Atchison.—Orders.—Reference and reply to a letter from Lieutenant Donelson, published on last page of Vol. I.—Alarming report.—Engineers actively at work.—Small party sent to Panther Hill.—Abundance of game.—Wild horses seen by reconnoitering parties.—Eagle shot.—The first sage seen.—Crossing of Milk River.—A Deputation of Gros Ventres.—The Eagle Chief and White Eagle.—Little Soldier and White Antelope.—Governor Stevens's health improves.—Organization of two parties under Lieutenant Grover and Mr. Lander.—War between Gros Ventres and Blackfeet.—Its cause.—A Heroine.—Her Adventure.—The Comet.—Camp of the Gros Ventres.—Their habits.—Polygamy universal.—Feast and Council.—Their hatred against the Blackfeet.—Governor Stevens's conciliatory speech.—The meeting breaks up.—Further consultation.—Accept the advice of Governor Stevens.—Visit the Camp.—Firing of the howitzer.—Presents.—The Comet and Aurora Borealis.—Camp Armstrong.—Proposition of Lieutenant Grover.—Purchase and exchange of horses.—Suggestion of Lieutenant Donelson.—The Running Fisher.—Lieutenant Grover's field of duty.—Mr. Culbertson gives information concerning the Gros Ventres.—His Adventure.—The Prairie on fire.—Branches of Milk River issuing from the Cypress Mountain.—Bear's Paw in sight.—The Three Buttes or Sweet Grass Hills.—Singular fact connected with the streams of this region.—Apprehensions for the safety of Messrs. Lander, Grover, and Stanley.—A Spring.—An amusing story related by the Running Fisher.—Marias River.—Citadel Hill in sight.—Spot where a battle was fought between Gros Ventres and Crows.—Valley of the Teton.—Arrival at Fort Benton.

CHAPTER V.

Fort Benton.

Reports on the crossing of Mountains made by Voyageurs and Indians.—Itinerary of a Wagon Road from Fort Benton to Bitter Root Valley by the White Crane.—Voyageur Hammell's account of Cadotte's Pass.—Description of Forts Benton and Campbell.—Return of Lieutenant Grover's party.—Incidents of their trip.—Their sufferings from hunger.—Are relieved at Lieutenant Donelson's camp.—Mr. Stanley takes Daguerreotypes of the Indians.—Their ideas concerning him.—Lieutenant Grover despatched to Bitter Root Valley.—Dr. Evans arrives from Fort Union.—Report of his route.—A Blackfoot Council proposed.—Little Dog and Marias Pass.—Rotten Belly Rocks.—Origin of the name.—Despatch from Lieutenant Grover.—Return to Fort Benton.—Report of Lieutenant Saxton.—Arrives at Fort Vancouver.—Reaches the Dalles.—Organization of his party.—Leaves the Dalles.—Crosses the Des Chutes River.—Deputation of Cayuse Indians.—Excessive heat.—Walla-Walla River.—Fort Walla-Walla.—Antoine Plante.—Pu-pu-mux-mux.—Snake River.—Pelouse River.—Delegation of Pelouse and Nez Percés Indians.—Eloquent Speech.—The only mercurial Barometer broken.—Spokane River.—The Spokanes and their Chief.—Coeur d'Alène Prairie.—Pend d'Oreille Indians.—The whole region densely wooded.—The Valley of Clark's Fork.—Thompson's Prairie.—Crossing of Clark's Fork.—St. Mary's Village in the Bitter Root Valley.—Lieutenant McFeeley returns to Fort Vancouver.—Lieutenant Arnold left in charge of the Depot.—Lieutenant Saxton starts for Fort Benton.—Hell Gate.—Impropriety of the name.—Description of the country.—Its adaptation to be the great highway.—Meets Lieutenant Grover.—Their arrival at Fort Benton.—Mr. Tinkham returns to Fort Benton.—Incidents of his trip.—Mr. Stanley ascends the Three Buttes.—Monuments on the summits.—Botanical and Geological account.—Panoramic view.—Beds of Lignite and Coal.—Marias River.—The Trunk.—The Knee.—Teton River.—Governor Stevens resolves to substitute pack animals for wagons.—Mr. Doty is left at Fort Benton.—Meteorological Post.—Mr. Doty directed to hold a Council with the Western Indians.—Return of Mr. Stanley.—Report of his trip to Milk River.—The Piegans.—Cypress Mountain.—Pa-ko-kee Lake.—Old Indian Fort.—Bow River Valley.—Low Horn, chief of the Piegans.—Moving Camp.—Dogs.—Leaves Indian Camp with a Deputation for Fort Benton.—Partial Vocabulary.—Sketches.—Talk with Blackfeet, Piegans, and Blood Indians held at Fort Benton.—Interpreters.—Their duties.—Description of Indian

dresses and arms.—Complaints of the Chiefs.—Speech of Governor Stevens.—Reply of Low Horn.—Distribution of presents.—Speech of Low Horn to his Braves.—Idea of Peace received with satisfaction.—Separation of the party.—Lieutenant Saxton directed to report at Washington.—Lieutenant Grover to examine the Missouri.—Tribute to Mr. Doty.—Result of sojourn at Fort Benton.—Governor Stevens leaves Fort Benton.

CHAPTER VI.

Fort Benton to Bitter Root River.

The party leaves Fort Benton.—Teton Valley.—Antelopes.—Prairie Lake.—Sun River.—Claims of the Pend d'Oreilles.—Sun River Valley.—Old Blackfoot Camp.—Beaver Creek.—Goose's Neck in view.—Flathead Trail.—Blackfoot Trail.—Dearborn River.—Dividing Ridge.—Beautiful Scenery.—The Divide practicable for wagons.—Blackfoot River Valley.—Rich Gold Mine reported by the Indians.—The Cañon.—Black Bear and Cubs.—Hell Gate Valley.—Traveller's Rest Creek.—Fort Owen.—Mr. Lander kills a grizzly bear.—Train left by Lieutenant Saxton.—Arrangements to move.—Lieut. Donelson arrives with the main party.—Lieut. Mullan with a Flathead delegation arrives.—His trip.—Leaves Fort Benton.—Fords the Missouri.—Girdle Mountains.—Arrow and Judith Rivers.—Plateau between Girdle and Judith Mountains.—Crosses Muscle-shell.—Flathead Camp.—Friendly Reception.—Upper waters of the Missouri.—Dividing Ridge of the Rocky Mountains.—Little Blackfoot Valley.—The Blackfoot and Hell Gate Rivers.—Conference between Governor Stevens and Flathead Delegation.—Lieut. Donelson with main party follows Lieut. Saxton's Route.—Visit to Victor's Camp.—Arrival of Mr. Tinkham and Lieut. Mullan.—Mr. Tinkham's account.—Clark's Fork.—Jocko River Valley.—Meets Lieutenant Donelson.—Flathead Fort.—Mr. Tinkham sent again across the mountains.—Instructions despatched to Lieut. Donelson and Mr. Doty.—Victor, the Flathead Chief.—Character of Route from Jocko to Big Blackfoot.

CHAPTER VII.

Bitter Root River to Fort Walla-Walla.

Governor Stevens starts with a small party.—Meets Mr. Lander.—Party of Nez Percés.—Inexhaustible beds of limestone and marble.—Ascent to Dividing Ridge.—View from the highest point.—Description of Cœur d'Alène or Stevens's Pass.—Cœur d'Alène Mission.—Père Gazzoli and Père Ravalli.—Charles Huet and Maginn.—Burial of an Indian Chief.—Buildings and church of the Mission.—Management of Missionary Affairs.—Sketch of the Mission.—Ingenious method of deer hunting.—Governor Stevens's address to the Indians of the Mission.—Departure.—Wolf's Lodge.—The Spokanes at their devotions.—Talk held with them.—Cœur d'Alène Prairie and Lake.—Trout Fishing.—Falls of Spokane River.—Spokane House.—Spokane Camp.—Garry's visit to Governor Stevens.—Starts for Colville.—Information of McFeeley's arrival at Walla-Walla.—Arrival at Colville.—Meets Captain McClellan.—Main facts of the Exploration of the Cascades.—Captain McClellan reaches Vancouver.—Procures pack-animals.—Preparations of Lieutenant Saxton's party.—Organization of the party.—Indian Guides.—Adopts the trail of the Klikitit Pass.—Slow Progress.—Scarcity of grass.—Cascade Range.—Passes explored.—The Klikitit.—Valley of Cathla-poo-tle.—Delightful Climate.—Depot Camp.—Lieut. Hodges sent across to Fort Steilacoom.—Captain McClellan's party surveys the Na-chess Pass.—Lieutenant Duncan explores the Upper Yakima.—Mr. Gibbs the Lower Yakima.—Klikitat Tribe.—Kamiakin in council with Captain McClellan.—Lieutenant Hodges in distress.—Return of Lieutenant Duncan and Mr. Gibbs.—Main body moves into the Yakima Valley.—Captain McClellan examines the Passes of the head of the river.—Lieutenant Duncan the neighboring country.—Gold discovered.—Lieut. Mowry returns from the Dalles.—Arrival of Lieut. Hodges.—Further reduction of the force.—Lieut. Mowry's Explorations.—Fort Okinakane.—Fort Colville.—Mission under Père Louis.—Mr. McDonald.—Legends.—Programme.—Colville Settlements.—Camp Washington.—Spokane Graves.—Never-Freezing-Water Lake.—Indian Legend.—Painted Rocks.—Crossing of the Peluse and Snake Rivers.—Falls.—Indian Legend.—Walla-Walla Valley.—Hudson Bay Farm.—Mr. McBane.—Father Chirouse.—Pu-pu-mux-mux.

CHAPTER VIII.

Fort Walla-Walla to Puget Sound.—Substance of Reports of Messrs. Gibbs, Arnold, Suckley, McClellan, and Tinkham.

Mr. Osgood moves for the Dalles.—Nachess Pass frequently open till December.—Lieut. Donelson and Capt. McClellan reach Walla-Walla.—Incidents of Lieut. Macfeeley's trip.—A soldier loses the track in the snow.—Is cared for by Nez Percés.—Governor Stevens descends the Columbia in a canoe.—Reaches the Dalles.—Major Rains.—Colonel Bonneville.—Van

couver.—Olympia.—Mr. Gibbs descends the Columbia.—Baker's Bay.—Shoalwater Bay.—Oysters.—Willopah River.—Governor Stevens visits Vancouver's Island.—Port Townsend.—Straits of Fuca.—Neeah Bay.—Lieut. Arnold and Dr. Suckley reach Olympia.—Summary of Lieut. Arnold's trip.—Ascends the Columbia to the mouth of Clark's Fork.—Kettle Falls.—The Great Plain.—The Spokane.—The Great Coulee.—The Yakima.—Snake River.—The Fathers of the Lower Pend d'Oreille Mission and Dr. Suckley.—Dr. Suckley descends the Bitter Root in a canoe.—Ignatius Mission.—Arrives at Fort Colville.—Reaches Vancouver.—His collection of specimens of Natural History and Geology.—Capt. McClellan's trip.—Leaves Olympia in a canoe.—Arrives at Steilacoom.—Snohomish River.—Returns to Olympia.—Mr. Tinkham's trip.—Leaves the Jocko River.—Arrives at Fort Benton.—Fords the Missouri.—Prickly Pear Creek.—Little Blackfoot and Hell Gate Rivers.—Crosses Bitter Root Range.—Description of the route explored.—Clear Water Valley.—Reaches Walla-Walla.—Receives instructions from Governor Stevens.—Ascends the Columbia to mouth of the Yakima.—Ascends the Yakima.—Kle-allum Lake.—Pays great attention to the measurement and examination of the snow.—Descends the Western slopes of the Yakima Pass.—Nook-noo River.—Ranger's Prairie.—Falls of the Snoqualmoo.—Reaches Seattle.

CHAPTER IX.

Trips of Lieutenants Mullan, Grover, and of Mr. Doty.

Lieutenant Mullan's trip.—Ascends the Bitter Root to its source.—Quantity of snow.—Crosses Dividing Ridge.—Returns to Cantonment Stevens.—Reaches Fort Hall.—Description of Bitter Root Valley.—Delightful climate.—Reaches Ross Hole Prairie.—Ascends Big Hole Mountain.—Strikes a branch of Wisdom River.—Crosses Big Hole Prairie.—Crosses again the Rocky Mountains.—Mountain Sheep.—Medicine Lodge Creek.—Kamas Prairie Creek.—Market Lake.—Descends Snake River.—Arrives at Fort Hall.—Starts northward.—Follows High Bank Creek.—Hooked Man's Creek.—Valley of Jefferson's Fork.—Favorite Indian hunting ground.—Reaches again Wisdom River.—Its valley.—Deer Lodge.—Follows the Hell Gate.—Conical Mound.—Hot Springs.—Reaches Fort Owen.—Lieutenant Grover's trip.—Leaves Fort Benton.—Great Falls of the Missouri.—Surveys the Missouri to the mouth of Milk River.—Bluffs of the Bear's Paw Range.—Citadel Rock.—Mauvaises Terres.—Important data.—Lieutenant Saxton descends the Missouri from Fort Benton to Leavenworth.—Lieutenant Grover leaves Fort Benton.—Reaches Cadotte's Pass.—Crosses Dividing Ridge.—Proceeds down Big Blackfoot River.—Passes Hell Gate Defile.—Leaves Fort Owen.—Pend d'Oreille and Cœur d'Alène Lakes.—Arrives at Walla-Walla.—Governor Stevens leaves for Washington.—Lieutenant Mullan starts from Cantonment Stevens for Fort Benton.—Crosses the Missouri on the ice.—Reaches Fort Benton.—Follows the route to Sun River.—Valley of the Little Prickly Pear Creek.—Crosses the mountains.—Follows the valleys of the Little Blackfoot and the Hell Gate.—Reaches Cantonment Stevens.—Remarks of Mr. Doty on the same route.—Governor Stevens leaves New York.—Reaches Olympia.—Meets Lieutenant Mullan and Mr. Doty.—Higgins sent from the Dalles to Cantonment Stevens.—Summary of Lieutenant Mullan's and Mr. Doty's labors.—Lieutenant Mullan explores Flathead River and Clark's Fork.—Kamas Prairie.—Hot Spring Creek.—Flathead Lake.—Crosses Maple River.—Kootenay and Tobacco Rivers.—Ascends the latter to its source.—Falls of Tobacco River.—Headwaters of Hot Spring Creek.—Enters again Kamas Prairie.—Arrives at Cantonment Stevens.—Leaves again Bitter Root Valley.—Lou-Lou Fork.—Hot Spring, 132°.—Follows the route pursued by Lewis and Clark in 1805.—Kooskooskia River.—Enters the great plain of the Columbia.—Reaches Snake River.—Alpahwah Creek.—Crosses branches of the Tukanon and Touchet.—Meets Mr. Doty at Walla-Walla.—Reaches the Dalles, where his party is discharged.—Importance of the services rendered by Lieutenant Mullan and his party.—Incidents connected with his post in the Bitter Root Valley.—Erects four log buildings.—His judicious intercourse with the Indians.—Their regret at his departure.—Great privations endured by his party.—Valuable contributions furnished by Lieutenant Mullan to the existing knowledge of the country.

CHAPTER X.

Summary of explorations made by Mr. Doty and Lieutenant Arnold.

Mr. Doty leaves Fort Benton.—Great Falls of the Missouri.—Sun River.—The Rattlers.—Follows the course of Elk River.—Headwaters of the Teton.—Kayiyou, or Southern Branch of Marias River.—Cut Bank River.—Headwaters of Milk River.—Chief Mountain Lake.—Bow Lake.—Both lakes filled with beaver.—Abundance of game.—Mo-ka-un River.—Reaches latitude 49° 30'.—Retraces his route to Marias River.—Moves towards Fort Benton through Teton Valley.—Woman's Breast Hill.—Arrives at Fort Benton.—General Results.—Mr. Doty's trip to the Bitter Root Valley.—Lewis and Clark's

Pass.—Follows Governor Stevens's trail to Fort Owen.—Crosses the Big Blackfoot River.—Reaches Cantonment Stevens.—Follows the Hell Gate and Little Blackfoot Valleys.—Arrives at Fort Benton.—Starts down the river to meet the Company's boats.—Returns to Fort Benton.—Is directed to proceed to Olympia.—Pursues his trail of 1853.—Crosses the Cœur d'Alène river.—Cœur d'Alène Lake.—Peluse River.—Pyramid Butte.—Reaches Walla-Walla.—Crosses the Columbia.—Arrives at Olympia.—Mr. Doty's reports concerning the Blackfoot Indians.—Loss of Meteorological Observations.—No hopes for their recovery.—Governor Stevens recommends to the War Department an instrumental survey of the Snoqualmoo Pass.—His labors as Indian Commissioner among the Indians west of the Cascades.—Mr. Doty makes arrangements to hold councils with those Indians.—Governor Stevens joins Mr. Doty at Camp Stevens on Mill Creek.—General Concluding Remarks of Governor Stevens.—Abstract of Lieut. Arnold's Report to the War Department.—His Itinerary.—Completes the Military Road across the mountains.—Steilacoom.—Nisqually Plains.—Puyallup River.—S'kamish River.—Mud Mountain.—Green River.—Peak La Tête.—Mount Ikes.—View from its summit.—Nachess River.—Wenass Valley.—Yakima River.—Walla-Walla.—Table of Distances by the Odometer, fromWalla-Walla to Steilacoom, by Lieut. Arnold.—Foot Trail from Lake Kitchelus to the head of Snoqualmoo.—Character of the country.—Whole area of the Cascade Range.

NARRATIVE OF 1855.

CHAPTER XI.

Walla-Walla to Bitter Root Valley.

Circumstances of the exploration.—Walla-Walla Valley.—Touchet Valley.—Tukanon River.—Louis Maragué.—Pyramid Butte.—Lawyer, Head Chief of the Nez Percés.—Divide separating Snake from Peluse River.—Kamas Fields.—Cœur d'Alène Mission.—Stevens's Pass.—St. Regis de Borgia River.—Itinerary and minute description of route between Cœur d'Alène Mission and Bitter Root Valley.—Chiefs of the Pend d'Oreilles and Flatheads.—Indian Treaties.

CHAPTER XII.

Bitter Root Valley to Fort Benton, and Return to Olympia.

Hell Gate Valley.—Mr. Pearson's achievements as messenger.—Hell Gate Cañon.—Our Pend d'Oreille Guide's success in hunting.—Upper Blackfoot Valley.—The Prairie of the Knobs.—Salmon Trout Creek.—Belly Prairie.—Lander's Fork.—Routes for a Railroad.—Lewis and Clark's Pass.—Dearborn Valley.—Heart Mountain.—Debouche of Dearborn River.—Grizzly Bear Lake.—Mauvaises Terres.—Fine Springs.—Teton Valley.—Box Elder Creek.—Interesting Incident with Indians at Fort Benton.—Mr. Doty's search for stolen horses.—Crosses Milk River.—Lake Pah-ka-kee.—Belly River.—Bow River.—Returns to Fort Benton.—The Nez Percés and Flathead Camps.—Mr. Landsdale's examination of the Bitter Root Valley and of Flathead River.—The Council at the Mouth of the Judith.—Character of the surrounding Country.—Citadel Rock.—Mr. Pearson's return from Olympia.—His journey.—The Missouri towards Mouth of Marias.—Success of Blackfoot Treaty.—Return trip to Fort Benton and the Pacific.—Intelligence arrives of the Indian War in Oregon and Washington Territories.—Train halted.—Governor Stevens proceeds to Bitter Root Valley.—Mr. Doty returns to Fort Benton for supplies.—Fort Owen.—Hell Gate.—Alarming Reports.—Mr. Doty's arrival.—Crossing of Bitter Root Mountains.—Mr. Doty's examination of approaches to Stevens's Pass.—Meeting of Indians near Cœur d'Alène Mission.—Cordial reception.—Wolf's Lodge.—Stormy Councils on the Spokane with Indians.—Final success.—Hostile intrigues of Looking-Glass, a Nez Percés Chief.—Arrival at Walla-Walla.

GEOGRAPHICAL MEMOIR.

CHAPTER XIII.

Water Lines.—Eastern and Western Slopes.—Mountain Ranges.—Navigability of the Upper Mississippi.—Red River of the North.—Country West of the Shyenne to Mouth of Yellowstone.—Missouri and its Tributaries.

General Remarks on the Route near the Forty-seventh and Forty-ninth Parallels.—Water Lines on Eastern Slope: The Missouri; the Yellowstone; the Saskatchawan; the Peace River; the Red River of the North.—On the Western Slope: The Columbia; the Snake and Fraser's River.—Importance of the Great Lakes.—Mountain ranges dividing the tributaries of the Columbia and Missouri: The Rocky, Bitter Root, Cœur d'Aléne, and Kootenay Mountains; the Cascade Mountains.—Navigability of the Upper Mississippi.—Falls of St. Anthony—Sauk Rapids.—Western branches of the Mississippi: Crow Wing River, Sandy Lake, and Pakegon Falls.—The Lakes between Mississippi and Red Rivers.—Eastern branches of Mississippi: Rum River; the St. Croix; the Minnesota.—Water Line between Fort William, on Lake Superior, and Lake Winnepeg.—Advantages of Minnesota for railroad and water communication; abundance of timber; fertility.—Red River of the North.—Its tributaries: the Shyenne; Wild Rice River; Bois de Sioux River.—The Côteau des Prairies Plateau.—Dead Colt Hillock.—The region of the Bois de Sioux, the Shyenne and the Red River of the North.—The country west of the Shyenne to the mouth of the Yellowstone; the Côteau du Missouri; Miniwakan Lake.—Salt Lakes.—Mouse River and its valley.—The western part of the Côteau.—Mouth of the Yellowstone.—Missouri River.—Its origin.—Gate of the Mountains.—The Great Falls.—Fort Benton.—Characteristics of the river.—Its tributaries on the north and west shore.—The Big Muddy River.—Milk River.—The Bear's Paw.—Little Rocky Mountains.—Marias River and its valley.—The Teton.—Sun River—Dearborn River.—Little Prickly Pear Creek.—The Jefferson, Madison, and Gallatin Forks.—Its tributaries on the south shore.—Muscle Shell River.—Judith River—Arrow River.—Shonkin River.—Highwood River.—Belt Mountain Creeks.—Smith's River.—Landmarks: Highwood, Girdle, and Judith Mountains.—Buttes.—Soil of the Plateau.—Prairies at the Three Forks.

CHAPTER XIV.

The Mountains west of Fort Benton.—The Rocky Mountains.—Bitter Root River.—Clark's Fork.—The Passes.—The Columbia River, its tributaries and Valley.—Cascade Mountains.—The Rivers and Islands of the Sound.

The Mountains West of Fort Benton.—The Black Hills.—The rise between Fort Benton and Fort Union.—Observation on the climate and soil.—The Rocky Mountains.—Lewis and Clark's description.—The Soil.—Meteorological Observations.—The Kamas Prairies on the Kooskooskia.—The Western Backbone.—The Eastern Backbone.—The country between them.—The Water Lines.—The Bitter Root River near Big Hole Prairie.—Junction of the Hell-Gate and the Blackfoot.—Hell-Gate River and the Little Blackfoot Valley.—Deer Lodge Prairie and the Boiling Springs.—Tributaries of the Bitter Root below Hell-Gate—Flint Creek Valley.—Clark's Fork.—Flathead Lake.—Tributaries above and below the Lake.—Navigation of the River.—Soil of the Valley.—The Kootenay.—The Passes between the Missouri and the Columbia: Big Hole Pass.—Ross's Hole.—Hell-Gate Pass.—The Southern and Northern Little Blackfoot—Cadotte's Pass.—Lewis and Clark's Pass.—The Marias Pass.—The Passes to the Great Plain of the Columbia: The Southern and Northern Nez Percés' Trails.—Cœur d'Aléne or Stevens's Pass.—Area of arable and timbered land.—The Great Plain of the Columbia.—The course of the Columbia.—Its Navigability.—Obstructions.—Tributaries on the Eastern Shore, Snake, Spokane, Kooskooskia, Salmon, Walla-Walla Rivers and their valleys.—The Cœur d'Aléne.—Character of the Country.—Minerals at the Kootenay.—The Blue Mountains and the Tributaries of the Walla-Walla.—Lakes Pend d'Oreilles and Rootham.—Tributaries on the Western Shore of the Columbia: The Yakima.—The Pisquouse.—False reports concerning this region.—Agriculture of the Yakima District.—Tributaries of the Columbia from the South: The Umatilla—Willow Creek.—Butter Creek.—John Day's River.—Des Chutes River.—Cascade Mountains.—Their distance from the Coast.—The Peninsula between Puget Sound and the Coast.—Shoalwater Bay.—Gray's Harbor.—Chehalis River.—Willopah River.—The Qui-naiutl.—The Cowlitz.—The Des Chutes.—The Nisqually.—The Snohomish and the Snoqualmoo Falls.—The Sto-lu-kwha-mish.—The Dwamish.—The Nachess.—Trails at Lake Kitchelus.—The Nachess and Snoqualmoo Passes.—The Skagit—Character of other Rivers.—The Northern Boundary Line.—Quality of the land.

CHAPTER XV.

Hydrography of the coasts and navigable waters of Washington Territory, prepared by Dr. J. G. Kohl, United States Coast Survey.

Introductory Remarks.—Mount Olympus.—Shoalwater Bay.—Gray's Harbor.—Point Grenville.—Destruction Island.—Flattery Rocks.—Cape Flattery.—De Fuca's Strait.—Its General History.—Its Southern Shore.—Neeah Harbor.—False Dungeness Bay.—New Dungeness Bay.—Washington Harbor.—Port Discovery.—Admiralty Inlet.—Port Townsend.—Oak Bay.—Port Ludlow.—Suquamish Head.—Hood's Canal.—Dahap Inlet.—Useless Bay.—Skagit Head.—Dwamish Bay.—Commencement Bay.—Port Madison.—Port Orchard.—Bainbridge Island.—Blake Island.—Vashon's Island.—Puget Sound.—Nisqually River.—Mount Rainier.—Whidby's Island.—Possession Island.—Deception Passage.—General View of the de Haro Archipelago.—Canal de Haro.—De Haro Archipelago.—San Juan Island.—Henry Island.—Orcas Island.—Waldron Island.—Skip Tack and Freemann's Island.—Sucia Group.—Patos Island.—Matia Group.—Barnes's Island.—Clark's Island.—The Sisters.—Lopez Island.—Decatur, Blakely, Foost, Obstruction and Shaw's Islands.—Ontario Roads.—Frolic Strait.—Macedonian Crescent.—Rosario Strait.—Fidalgo Island.—Burrow's and Allen Islands.—Padilla Bay.—Guemes Island.—Cypress Island.—Bellingham Channel.—Sinclair's Bay.—Vendovi Island.—Bellingham Bay.—Point Francis.—Elisa's Island.—Lummi Island.—Hale's Passage.—De Lara's Gulf.—Gulf of Georgia.—Birch Bay.—Peninsula of Roberts's Point.—Fraser's River.—Mount Baker.

CHAPTER XVI.

Meteorology.

Cold as an obstruction to the railroad route.—Snow as an obstruction to the railroad route.—Observations on the Isothermal Chart.—Table of mean temperatures at stations between the mouth of the St. Lawrence and Puget Sound.—Comparison of Nebraska with regions having a similar climate in Europe.—Climate of Washington Territory.—General conclusions.

RAILROAD REPORT AND ESTIMATE.

CHAPTER XVII.

St. Paul to Bois de Sioux.—Bois de Sioux to Fort Union.—Fort Union to crossing of Milk River.—Crossing of Milk River to Fort Benton.—Fort Benton to entrance to Tunnel, Cadotte's Pass.—Hell Gate crossing, *via* Clark's Fork, to the Spokane.—Hell-Gate crossing to crossing of Bitter Root.—Crossing of Bitter Root to entrance to Tunnel through the Cœur d'Aléne Mountains.—Tunnel at Stevens's Pass of the Cœur d'Aléne Mountains.—Tunnel to the Cœur d'Aléne Mission.—Cœur d'Aléne Mission to crossing of Columbia.—Crossing of the Columbia to Seattle, on Puget Sound.—To Vancouver, on the Columbia, and thence to Puget Sound.—Estimate of Cost.

COMPUTATION OF ALTITUDES FROM BAROMETRICAL OBSERVATIONS.—TABLES OF HEIGHTS AND DISTANCES.—METEOROLOGICAL REGISTER.

CHAPTER XVIII.

Computation of Altitudes from Barometrical Observations.

Instruments.—Readings reduced to 32° F.—Loss of Field-books of 1853.—Lieut. Abbot's Table of Horary Oscillations in the Des Chutes Valley, Oregon Territory.—Mr. Doty's observations from Fort Benton to Badger River.—Corresponding observations at Fort Benton.—Sergeant Lint's observations at Cantonment Stevens.—Abnormal Oscillations.—Computa-

tion of Altitudes at the Stations Nos. 19 and 20.—Great rise of the Barometer at the Bitter Root River.—Observations at the mouth of the St. Regis de Borgia.—Simultaneous observations at Stations 103 and 114.—Mr. Doty's observations between the 11th and 22d of May, from Fort Benton to Sun River.—Tables of Sergeant Lint's observations from Fort Benton across Lewis and Clark's Pass.

Tables of Heights and Distances.

From Fort Benton, *via* Teton and Dearborn Rivers, through Lewis and Clark's Pass, September, 1854.—From Fort Benton, *via* Sun River and the Eastern Base of the Rocky Mountains, to Birch River, May, 1854.—On Governor Stevens's trip to and from the Blackfoot Council, 1855–'56.

Meteorological Register.

From October 2, 1854, to November 5, 1855.

LIST OF ILLUSTRATIONS.

MAPS.

One Map from Milk River to Crossing of Columbia.
One Isothermal Chart.

PROFILES.

One sheet of general profiles, with detached profiles of the principal Passes.

LITHOGRAPHS.

		Page.
1.	St. Paul	35
2.	Minnehaha, or Brown's Falls, near Fort Snelling	39
3.	Sauk River	45
4.	Lightning Lake	46
5.	White Bear Lake	48
6.	Pike Lake	49
7.	Bois de Sioux River	54
8.	Maple River	57
9.	Shyenne River	58
10.	Herd of Bison, near Lake Jessie	59
11.	Lake Jessie	60
12.	Camp of the Red River Hunters	65
13.	Butte de Morale	68
14.	Distribution of goods to the Assiniboines	76
15.	Near Mouse River	84
16.	Fort Union, and distribution of goods to the Assiniboines	85
17.	Council with White Man's Horse	89
18.	Milk River near junction of Missouri	90
19.	Cottonwood Grove	90
20.	Milk River and Panther Mountain	91
21.	Distribution of goods to the Gros Ventres	95
22.	Milk River, Bear's Paw Mountains in distance	97
23.	Bear's Paw	97
24.	Fort Benton	101
25.	Lieutenánt Grover's dispatch—Return of Governor Stevens to Fort Benton	107
26.	Marias River	112
27.	Blackfeet Indians—Three Buttes	115
28.	Teton Valley	117
29.	Approach to Cadotte's Pass	119
30.	Fort Owen, Flathead Village	122
31.	Victor's Camp, Hell-Gate Ronde	127
32.	Awaiting the return of Mr. Tinkham	127
33.	Nez Perces	131
34.	Crossing the Bitter Root	131

Page.
35. Cœur d'Aléne Mission, St. Ignatius River ... 133
36. Falls of the Spokane ... 135
37. Fort Okinakane ... 142
38. Hudson Bay Mill ... 147
39. Chemakane Mission ... 147
40. Mouth of Peluse River ... 151
41. Peluse Falls ... 151
42. Old Fort Walla-Walla ... 152
43. Dalles ... 155
44. Fort Vancouver, W. T ... 155
45. Cascades of the Columbia ... 155
46. Cape Horn, Columbia River ... 155
47. Kettle Falls, Columbia River ... 159
48. Grande Coulée ... 160
49. Big Hole Prairie from the north ... 169
50. Hot Spring Mound in the Deer Lodge Prairie of the Rocky Mountains ... 172
51. Bear's Teeth, Missouri River—Gate of the Mountains ... 178
52. View of the Rocky Mountains ... 178
53. Kamas Prairie of the Pend d'Oreilles ... 178
54. Clark's Fork ... 178
55. Flathead Lake, looking southward ... 178
56. Crossing the Hell-Gate River, May 5, 1854 ... 179
57. Entrance to Bitter Root Mountains by the Lou-Lou Fork ... 180
58. Hot Springs of the Lou-Lou Fork ... 180
59. Cantonment Stevens ... 181
60. Great Falls of the Missouri ... 183
61. Source of the Peluse ... 200
62. Big Blackfoot Valley ... 214
63. Rocky Mountains, looking westward ... 239
64. Hell-Gate, entrance to Cadotte's Pass from the west ... 244
65. Crossing the Hell-Gate River, January 6, 1854 ... 244
66. Bitter Root River near Fort Owen ... 250
67. Columbia River, Junction of Des Chutes ... 257
68. View of the Sound ... 289
69. Mount Rainier ... 290
70. Mount Baker ... 360

NARRATIVE OF 1853.

CHAPTER I.

SAINT PAUL TO PIKE LAKE.

Proposed railroad route from the Upper Mississippi to Puget Sound.—General Instructions.—The Exploration organized in two Divisions.—Eastern Division under the immediate direction of Governor Isaac I. Stevens.—Western Division under Captain Geo. B. McClellan.—His Instructions.—Lieutenant J. K. Duncan and Dr. J. G. Cooper, attached to Western Division, sent to the Columbia river.—Lieutenant Saxton sent to the Columbia valley.—His Instructions.—Preparatory measures.—Compilation of a map on a large scale.—Lieutenant Donelson sent to Montreal.—Mathematical Instruments.—Organization of the Eastern Division.—Lieutenant Donelson sent to survey the Missouri.—Messrs. Tinkham and Lander to examine crossings of the Mississippi.—Captain Gardiner to select escort.—Lieutenant Du Barry to secure guides at Pembina.—Governor Stevens leaves Washington City.—His authority to make treaties with certain Indian Tribes.—Arrives at St. Louis.—Mr. Stanley.—Quartermaster's arrangements not completed.—Fur Company's boat leaves St. Louis.—Instructions to Dr. Evans.—To Mr. Culbertson.—Governor Stevens leaves St. Louis.—Aurora Borealis.—Arrives at St. Paul.—Scenery.—Camp at Amelia.—Breaking in of mules.—Good locations for railroad bridges.—Orders to Lieutenant Du Barry countermanded.—Mr. Dahl proceeds to Pembina.—Mr. Lander to Sauk Rapids.—Instructions.—Accident.—Mr. Tinkham's party.—Meteorological and Astronomical Observations.—Captain Gardiner relieved from duty on account of ill health.—Simpson's party.—Laughing Water Cascades.—Scenery below the Falls.—The command sent forward in three parties, under Lieutenant Grover, Lieutenant Du Barry, and Mr. Everett.—Governor Stevens at St. Anthony.—Large encampment of Winnebagoes.—Description of the country.—Mississippi River.—Canadian voyageurs.—Governor Stevens at Lieut. Grover's camp.—At Mr. Lander's.—Cold Spring River.—Camp Davis.—Lieutenant Grover's route from St. Anthony.—Arrival of Lieutenant Du Barry and Messrs. Doty and Simpson.—Messrs. Kendall and Osgood reach camp with barometers and India rubber boats.—Mr. Everett.—Bad condition of animals.—Reading of camp regulations.—Address of Governor Stevens.—His views cordially approved.—Lieutenant Grover despatched to White Bear Lake.—His Instructions.—Mr. Tinkham applies for more voyageurs.—Dr. Suckley's party.—His Instructions.—Order issued by Governor Stevens.—Pembina carts.—Organization of the whole camp.—Paul Boulieau.—Scientific corps.—Lieutenant Du Barry, executive officer.—His Instructions.—The train.—Description of the country from Camp Davis to Cold Spring.—Sauk River.—India-rubber boats.—Lake Henry.—Mr. Tinkham at Lightning Lake.—Deep Slough.—Crow-Wing River.—A cool spring.—Series of small lakes.—Lake Ramsey.—Lightning Lake.—Meeting of Lieutenant Grover, Mr. Lander, and Mr. Tinkham near White Bear Lake.—Lieutenant Du Barry relieved from duty.—Ordered to report to the Adjutant General.—Mr. Kendall accompanies him to Long Prairie.—Captain Remenyi and Mr. Jekelfaluzy discharged.—Baggage weighed, and loads distributed.—Governor Stevens pushes forward with Dr. Suckley and the scientific corps.—Lake Stanley.—Arrival at White Bear Lake.—Description of the country from Lightning Lake to White Bear Lake.—Lambert River.—Governor Stevens joins Messrs. Grover, Lander, and Tinkham at Pike Lake.—Pike Lake, the real starting point of the exploration.—Camp Marcy.

On the 8th of April, 1853, I was assigned to the duty of exploring a route for the Pacific railroad from St. Paul, or some eligible point on the Upper Mississippi, to Puget Sound. My instructions required me to examine carefully the passes of the several mountain ranges, the geography and meteorology of the whole intermediate region, the character, as avenues of trade and transportation, of the Missouri and Columbia rivers, the rains and snows of the route, especially in the mountain passes, and, in short, to collect every species of information bearing upon the question of railroad practicability. It was necessary, moreover, to give great attention to the Indian tribes, as their friendship was important to be secured, and bore directly upon the question both of the Pacific railroad and the safety of my party.

As the route was comparatively new and unexplored, it was determined to organize the whole command into two divisions—the eastern division being under my immediate direction, and the western division under Captain George B. McClellan, of the corps of engineers, who was ordered to report to me, and whose field of duty is best shown by the following extract from the general instructions: "A second party will proceed at once to Puget Sound and explore the passes of the Cascade range, meeting the eastern party between that range and the Rocky mountains, as may be arranged by Governor Stevens."

To this party were assigned Lieutenant J. K. Duncan, United States army, and Dr. J. G. Cooper, surgeon and naturalist. Lieutenant Duncan left New York on the 5th of May, and was instructed to repair to the Columbia river, and make every possible arrangement in the way of collecting transportation and supplies in anticipation of the arrival there of Captain McClellan, who being in Texas at the time of his assignment to the command of the western division, was necessarily late in reaching Washington city. Dr. Cooper accompanied him. Captain McClellan arrived on the 8th of May, and, besides the charge of the western division, was, under the direction of the Secretary of War, assigned to the charge, under my general supervision, of opening the military road from Fort Steilacoom to Fort Walla-Walla. Leaving on the steamer of the 20th of May, he was joined on his way by Mr. Jos. Minter, as assistant engineer, and, on his arrival on the Columbia, organized his scientific corps by the addition of Lieutenant S. Mowry, United States army, as meteorologist; Mr. Geo. Gibbs, as ethnologist, geologist, and interpreter. Lieutenant H. C. Hodges, 4th infantry, was assigned to duty with him, in command of the escort, and as acting quartermaster and commissary.

Lieutenant Saxton was assigned to duty with the exploration as quartermaster and commissary, and was directed to repair to the Columbia valley, organize a suitable party, and establish a depot of four thousand rations of provisions in the Bitter Root valley. He was to make the best examination of the route which his means afforded, and when the depot was established was directed to continue on his course eastward until he joined the eastern division. Fort Benton was indicated in his instructions as the point of meeting. Thus, in fact, three distinct parties were in the field: the eastern division, the western division, and the party under Lieutenant Saxton.

I relied upon Lieutenant Saxton gaining such knowledge of the country intermediate between the two division, as would enable me to combine their labors and insure the exploration of the whole route in a single season. Much attention was given by me to the collecting of all existing information. All the books bearing upon the subject were carefully examined, and a map, on a large scale, was compiled, showing everything which had been published. A copy of this map was placed in the hands of chiefs of parties. Lieutenant Donelson was despatched to Montreal to confer with Sir George Simpson, for the purpose of gaining information in regard to the route, to secure guides from the Red River settlement, and to obtain provisions and supplies from the Hudson Bay posts in case of necessity. Many instruments were to be made. The portable transit and the barometers were all constructed after the issuing of my instructions of April 8.

After considering the subject maturely, I determined to rendezvous the main party in a camp near St. Paul, and thence to start on the survey. To send a small party up the Missouri, making a survey of the river on the way up, to establish a post at Fort Union, and examine

the adjacent country, whilst I went in person from St. Paul. Before resolving upon this course, the question was carefully considered as to whether a steamer should not be chartered to take the main party up the Missouri to Fort Benton and throw it upon the mountains at once, leaving to a small party the duty of moving from St. Paul overland. A steamer which was thought suitable was found at Pittsburg, and I had the refusal of it at a very low charter. This plan was rejected, because it introduced an element of uncertainty into the operations. I could not be sure that it was suitable for the navigation of the Missouri, nor was I certain that I could take her to Fort Benton. There being no doubt whatever of the practicability of the overland route from St. Paul for the main party, it was adopted, and with the more readiness, as the animals required for the examination of the passes would move my party from the Mississippi to the mountains.

The eastern division was provided with the following corps of officers and civilians for the scientific objects of the exploration, and for quartermaster and commissary duties: Captain J. W. T. Gardiner, 1st dragoons; Lieutenant A. J. Donelson, Corps of Engineers, with ten sappers and miners; Lieutenant Beekman Du Barry, 3d artillery; Lieutenant Cuvier Grover, 4th artillery; Lieutenant John Mullan, 2d artillery; Isaac F. Osgood, disbursing agent; J. M. Stanley, esq., artist; Dr. George Suckley, surgeon and naturalist; F. W. Lander and A. W. Tinkham, assistant engineers; John Lambert, topographer; George W. Stevens; William M. Graham, and A. Remenyi, in charge of astronomical and magnetic observations; Joseph F. Moffett, meteorologist; Thomas Adams, Max Strobel, Elwood Evans, F. H. Burr, and A. Jekelfaluzy, aids; and T. S. Everett, quartermaster and commissary's clerk. Of whom Lieutenant Donelson, with six sappers, Lieutenant Mullan, and Mr. Graham were assigned to the duty of surveying the Missouri and establishing the depot at Fort Union, while the remainder constituted the main party to rendezvous near St. Paul.

Dr. John Evans was appointed the geologist of the exploration. Since 1851 he had been in the service of the Department of the Interior, making a geological survey of Oregon and Washington Territories, and it was believed that the public service would be best promoted by securing his co-operation with the geological portion of the exploration. He had passed over portions of the route, and, whilst preparing for the expedition, he furnished me with information in regard to the general course of Milk river, of passes from the Missouri to the Bitter Root valley, of the valley itself, and of the route thence, of Lewis and Clark, by the Lou-Lou Fork, or Traveller's Rest creek, to Fort Walla-Walla. He drew up instructions to guide in making the collections of the exploration, and was himself provided with the funds deemed, in his judgment, necessary to make the trip across the continent in connexion with the work of all the parties of the exploration. It seemed that thus the most ample and effective means were taken, both to make the geological results of the exploration complete, and to advance the general service on which Dr. Evans was employed by the Interior Department. For, whilst the expenses and collections of his trip were on account of the exploration, he was empowered, after submitting his exploration report, to embody anything thus gained in his final geological report to the Department of the Interior.

A. W. Tinkham and F. W. Lander, engineers, were despatched, in April, to St. Paul, to examine the several crossings of the Mississippi, and to collect information generally in that region until my arrival; and Lieutenant Grover, with his clerk, T. S. Everett, was sent to St.

Louis as quartermaster and commissary, in place of Lieutenant Saxton, sent to the western coast to make the necessary arrangements for supplies and transportation.

Captain Gardiner, under date of the 21st of April, was instructed to repair to St. Paul, *via* St. Louis, to hasten on the quartermaster and commissary arrangements, select the escort, establish the camp near St. Paul, and prepare the expedition for the field; and Lieutenant Du Barry, under date of April 26, was also despatched to St. Paul, with instructions to organize at that point a party of four men, push forward to Pembina, on the Red River of the North, and secure the guides to be sent there by Sir George Simpson. He was then to proceed in a west by south course, north of the Miniwakan lake, to effect a junction with the main party moving south of that lake, the main object of his trip being to bring to the main party the desired guides in the shortest possible time. Captain Gardiner proceeded in execution of the duty assigned to him, and established the camp before my arrival; but Lieutenant Du Barry did not go to Pembina, for reasons hereafter to be mentioned.

I will here observe, that in the several instructions I enjoined the utmost economy on the part of chiefs of parties; but care was taken to impress upon them the necessity of making such arrangements as would make the several branches of the expedition self-depending. Whilst I had taken the necessary precaution to get supplies from the Hudson Bay posts in case of necessity, I was anxious that such necessity should not occur, and I wrote both to Governor Simpson, at Montreal, and Governor Ogden, at Vancouver, not to accumulate supplies at their several posts for the use of my parties.

The other gentlemen also followed, some to St. Louis and some to St. Paul, and by great exertion my arrangements were sufficiently matured to enable me to leave Washington on the 9th of May. I had authority from the Indian department to hold councils with the Indian tribes on the route, and to make treaties with such as were not included within the limits of any existing superintendency. This applied especially to the Blackfeet, who were the only Indians on the route not included either within the northern or western superintendency.

Accompanied by Mr. Stanley, the artist of the exploration, I arrived at St. Louis on the 15th of May. Mr. Elwood Evans was left behind to complete the arrangements. Here I met Lieutenants Grover, Donelson, and Mullan, who had preceded me. The quartermaster arrangements were not as far advanced as I anticipated. The mules were not to be delivered at St. Paul till about the 26th of May, and the Fur Company's boat was not to start until the 20th of May. Accordingly I determined to remain in St Louis to complete the arrangements for transportation and to provide for the establishment of a depot at the mouth of the Yellowstone.

At St. Louis, also, I secured the services of Alexander Culbertson, esq., as special agent among the Blackfeet Indians. He had resided many years among this tribe, and has had charge of the forts of the American Fur Company on the Missouri. His reputation is decidedly high as a man of character and great influence over these Indians.

On the 21st the Fur Company's boat left St. Louis, having on board the supplies intended to meet us at Fort Union, with the party under Lieutenant Donelson, already referred to, with the addition of Dr. Evans, the geologist of the exploration. Lieutenant Donelson is instructed to make the best possible survey of the Missouri that is permitted by his circumstances as a passenger on the steamboat, and to prepare a report on the capacity of the Upper Missouri for

SAINT PAUL.

steamboat navigation, giving particular attention to obstructions in the river, and the cost and means of removing them.

During Mr. Graham's stay in St. Louis he had the misfortune to let his chronometer run down. Dr. Evans, on reaching Fort Union, was to leave the steamer, make an examination of the country southward, especially in the "Mauvaises Terres," and thence proceed on his overland journey to Oregon and Washington, meeting us at Forts Union and Benton. Special Agent Culbertson was instructed to send forward an express on his arrival at Fort Union, with presents of tobacco for the Blackfeet, to advise them of the expedition about passing through their country, and to secure suitable guides and hunters to accompany us.

Before starting from St. Louis to go up the Mississippi I became seriously alarmed on account of the character of the mules which had been contracted for by the quartermaster for the expedition. They were sound, excellent animals, but many of them were but three or four years old, and nearly all unbroken. I had despatched Mr. Charles Taphin to St. Louis, with instructions to procure broken, serviceable animals which had made a journey across the plains, having been assured that they could be purchased without difficulty. I determined, therefore, as I went up the river, to purchase at every landing place all the serviceable broken mules that I could find, so as to insure being able to move quickly on reaching the point where my camp had been established.

I will here remark that Lieutenant Grover and Mr. Everett preceded me a few days to St. Paul.

Leaving St. Louis on the 23d of May, on my way up the Mississippi, I succeeded in purchasing at the several landings two teams of strong, well broken mules, and four horses; in some cases buying the mules from the teams on the wharves.

At Galena, where we remained the night of May 24th and 25th, I was surprised at meeting Mr. Evans, who I had supposed could not yet have finished his business in Washington. During the evening we observed the aurora borealis. At this point some animals were purchased, and a number of articles for the expedition.

Leaving Galena on the 25th, on the steamer Nominee, we proceeded up the river, and were enabled to make shorts stops at Dubuque, Prairie du Chien, Lansing, La Crosse, and other places. At Holmes's Landing I examined the United States dredge-boat George W. Jones, Captain Barrey. Intervals of leisure were employed in reporting fully to the War and Interior Departments my proceedings thus far, and the arrangements in contemplation for the execution of my several trusts. We arrived at St. Paul the evening of May 27.

The scenery on the Mississippi is bold, and at times beautiful, though but little variety is presented. Bluff banks on both sides, topped with trees, line its banks, and occasionally marked views occur, among which I might mention, as the most prominent, Lake Pepin, Maiden Rock, Barn Bluffs, &c.

ST. PAUL.

St. Paul (see accompanying sketch) is beautifully located upon a high bluff on the east bank of the river, and is rapidly growing in size and importance. It is quite a business place, everything indicating vigor and activity. Among its prominent buildings are the territorial capitol, modelled after the Capitol at Washington, and several very fine churches.

Starting from St. Paul at $3\frac{1}{2}$ a. m. on the 28th, I reached our camp in about an hour, and had the pleasure of rousing the gentlemen of the expedition from their sleep. Captain Gardiner had located our camp on the borders of Lake Amelia, and, in honor of the President, I called it Camp Pierce. It was situated about nine miles from St. Paul, and about three northwest from Fort Snelling. About a quarter of a mile to the eastward lay another lake or pond, connected with Lake Amelia by a creek, which was very convenient for watering our animals, and formed a fine meadow on which they grazed. These lakes furnished us with fish in abundance, consisting of bass, pickerel, and sunfish. Dr. Suckley here made a very handsome natural history collection.

The mules presented a fine appearance, and were apparently strong and healthy, though young and even more unbroken and unserviceable than I had feared. Not a single full team of broken animals could be selected, and well broken riding animals were essential, for most of the gentlemen of the scientific corps were unaccustomed to riding. I felt that time was precious, and a great difficulty to be overcome, so at once resolved that the whole force should set to work to break them.

Fortunately my purchase of mules along the river enabled me to break in the animals rapidly to the teams, by which they were started several days earlier than otherwise could have been done. The grass, however, is backward, and some forage will be required on the road for a few days to come.

After a brief visit to St. Paul in the course of the day to attend to business connected with supplies and information of the country, in which connexion I desire particularly to make my acknowledgments to Captain J. H. Simpson, United States Topographical Engineers, I finally, towards night, took up my quarters at Camp Pierce. I had, however, much positive information in regard to the country, derived from the labors of Mr. Lander. In obedience to his instructions he had, previous to my arrival at St. Paul, examined the several crossings of the Mississippi, as high up as the Little Falls, and had collected information as to the general character of the country on either bank of the river. There were good locations for railroad bridges at the Falls of St. Anthony; near the mouth of Sauk river; at the mouth of the River Watab; near the mouth of Swan river; and near Little Falls. Indeed, the bridging of the Mississippi was found to be an entirely practicable undertaking, and the principal question was to select a point which would lead us on a practicable line on our general westward course, have an easy and as short a connexion as possible with Lake Superior, and be in a region of country over which we could pass our wagons. It was not doubted that a line could be run westward from the Falls of St. Anthony, but it would be through a wooded country, where much cutting would be required for our train. By crossing at Sauk Rapids we entered at once upon the Red river trail, known to be practicable, though thus early in the season somewhat difficult for wagons. The country westward from Little Falls, at least to Long Prairie, to which point it was examined, was extremely favorable; but there was the same difficulty in moving with a train as from the Falls of St. Anthony. The object of the exploration being to determine the question of practicability, rather than the best route, and the details of locations, I determined to cross the Mississippi at Sauk Rapids, continuing for some time on the Red river trail, and then move as the information, yet to be collected, should determine.

It will be observed that, notwithstanding my delays in St. Louis, I reached St. Paul in two

days after the establishment of the camp by Captain Gardiner, and before Lieutenant Du Barry had been able to make his arrangements to proceed to Pembina, as instructed, for the guides to be sent there by Sir George Simpson. It was now obvious to me that I must abandon all idea of assistance from this quarter in order to save time absolutely indispensable to make the exploration to the Pacific the present season; and that decisive and prompt measures were required to take the field at once with the whole party. I was apprehensive that there would be much delay at Pembina in the arrival of the guides at that point, and that if we made them an element of our movement we would be detained west of the Miniwakan lake when we ought to be moving. Accordingly, I countermanded Lieutenant Du Barry's orders, and assigned him to duty in charge of the meteorological observations, and, through the kind offices of Hon. H. H. Sibley, the present governor of Minnesota, procured Mr. Dahl to proceed to Pembina, to compensate the hunters for their loss of time, and the Hudson Bay Company for the expense to which they had been put in forwarding supplies. I determined also to start off advance parties and small trains immediately, in order to infuse hope into the whole party and avail myself of the present high spirit of the camp.

Moreover, there was every reason why reconnoitering and surveying parties should be kept ahead, in order to procure timely information, both of the features of the country, which would determine our general course, and the special difficulties which might impede our progress; and we had the experience of the good results already obtained by pursuing this course, not only to justify but to render imperative its being persisted in.

The next two days (29th and 30th) were rainy, and were spent in camp, examining into and arranging the details of organization. Lieutenant Grover was relieved, at his own request, from the duties of acting quartermaster and commissary, that he might attend to scientific duties, and Captain Gardiner was appointed to take his place. The astronomical and magnetic observations were assigned to Mr. G. W. Stevens and Captain Remenyi.

May 31.—Mr. Lander was despatched this morning, with Mr. Evelyn as assistant, and two teamsters, in charge of a wagon, drawn by mules never before in harness, to proceed northward, on the east side of the Mississippi river, to Sauk Rapids, where he was to make arrangements for crossing the main party, which would follow in a few days. From Sauk Rapids he was to continue westward, carefully reconnoitering the country as he advanced, looking to the several routes along which lines were believed to be practicable, one crossing the Shyenne river once and passing just south of Miniwakan lake, another crossing this river twice and passing some thirty miles south of the lake, and a third passing by the headwaters of the southern tributaries of that river, in the general direction of Dead Colt Hillock, a prominent landmark, to the Coteau des prairies, the object being to keep all these lines in view, and not to make the final determination till all the facts bearing upon the question were ascertained; besides which, he was enjoined to make the necessary arrangements for the crossing of the several streams by the main party, and to neglect no opportunity of communicating with me as to his movements and operations. He was authorized to engage additional men and means of transportation.

The wildness of the animals which were selected may be shown by the fact that when Mr. Lander mounted the mule selected by him for his own use he was thrown with such force as to dislocate his shoulder, which required the force of three men to replace it; after which he again mounted and rode off at the head of his small party.

Mr. Tinkham and his party were fitted out this morning with a common wagon, (to be replaced by a spring wagon,) with the second mule team brought up on the Shenandoah, a good teamster, provisions for fifteen days, and the necessary tents, arms, and ammunition. He was directed to follow the general course reconnoitered by Mr. Lander, collecting as much data in reference to the details of the construction as practicable, so arranging the scale that, with his present force and a few days' experience, he would be able to travel fifteen or twenty miles a day. He was to connect the astronomical and magnetic observations with his route, leaving at each camping ground some mark by which subsequent observations could be connected with his work. Careful notes were to be made of the supplies of wood, water, and grass at each camping place, and sketches taken of the country. On reaching the Sauk Rapids he was to make a rapid instrumental survey of them, and cross without waiting for the main train. Additional men were to be employed if necessary. It was suggested that his journal, with a description of the crossing of the Mississippi, would be the best thing as a report.

Mr. Tinkham and party moved off a little after 12 m.

June 1.—Although it rained heavily all day, every one in camp was engaged in breaking mules. Mr. Stanley, who has been for several days at St. Paul on business, arrived at camp. Captain Gardiner is severely indisposed, having been unwell ever since my arrival.

June 2.—Mule breaking caused many an amusing scene. Several of the party were thrown repeatedly, but the determination they evince must overcome all obstacles; and I feel not only pleased to see their spirit, but to congratulate myself and them that no accident has occurred worthy of mention. Much hilarity was produced by the efforts of different persons, and each fall occasioned a laugh. Thus what I had seriously expected to prove a great difficulty was, in the midst of a heavy rain and gloomy weather, a source of mirthful enjoyment.

The meteorological and astronomical observations are now fully started. All the observers are diligent and interested in their duties.

June 3.—Mr. Doty started off early this morning with a train of three wagons and twenty-four pack mules. He was instructed to follow the stage road from St. Anthony to Sauk Rapids, and to cross the Mississippi at some point to be selected by me. I enjoined vigilance and the greatest care of the animals, no harsh usage of them, and the strictest economy of the stores; directing short marches, night guards, and half rations of oats for the mules, as well as personal attention to the proper management of each man and animal, giving him power to discharge men if necessary.

Early in the evening Captain Gardiner submitted an application to be relieved from duty on account of ill health, asking to be ordered to report at Washington, and enclosing a certificate from Dr. Suckley. In granting his application I expressed great regret that the expedition should be deprived of his services, and thanked him for his efforts towards its success.

In relieving Captain Gardiner, as quartermaster and commissary of the party, I did not deem it necessary to assign the escort to the special command of one of the officers of the army on duty with the expedition. The sergeant in command of the escort had, in orders, been directed to report to me in person.

June 4.—To-day I issued orders for the whole camp to be in readiness to move on Monday next, (the 6th,) so as to reach Sauk Rapids on Friday and cross the river on Saturday. The

MINNEHAHA OR BROWN'S FALLS NEAR FORT SNELLING

officers and gentlemen of the scientific corps will take the boat at the Falls on Monday and reach Sauk Rapids Tuesday evening, where an astronomical and magnetic station will be established.

I sent off, in charge of Mr. Simpson, a small party of wagons, the mountain howitzer, Corporal Coster and three men with twelve pack mules. A report from Mr. Lander, at Sauk Rapids, announcing his encampment on the west side of the Mississippi and giving notes of the camping ground, enabled me to furnish information to Mr. Tinkham and the teams in charge of Doty and Simpson, to regulate their marches.

One of the curiosities of our vicinity, which was sketched by Mr. Stanley, and which is shown in the accompanying sketch, (No. 2,) is the Minne-ha-ha, or the Laughing Water, called also Brown's Falls. It is situated west of the Mississippi, and distant about three miles from Fort Snelling. Ten miles above the Falls the stream flows from Lake Calhoun, and it passes through a level but fertile prairie, its margin decked with a wholesome growth of willow, poplar, and hazel, while at a short distance there are little forests of black-jack (*Quercus imbricaria*, *Michaux*) and other trees of like character. Here the sheet of water is from twenty to twenty-five feet wide, and its fall forty-one feet. The rock over which it pours shelters an oval cave about seventy-five feet wide and thirty feet from the falling water to the back. The view is taken from beneath this shelving rock. Though the magnitude of this cascade is not such as to excite our wonder, its picturesque beauty and pleasing melody attract the admiration of every visitor.

Below the Falls, the aspect is quite different. The stream glides along in its rocky channel, forty to fifty feet from the top of the steep rocky banks, for about four miles, to the Mississippi river, overshadowed, on both sides, by a forest of oak, ash, maple, and other trees, with their attendant vines and deep undergrowth. The soil above this valley is very rich, and there are good grounds for the opinion that the axe, the plough, and the mill-wheel will before long invade and materially change the character of the scene.

This stream is usually perfectly clear. So short, indeed, is its course, that it seldom becomes in any degree turbid or largely increased in volume.

June 6.—Broke up camp at 10 a. m., sending forward the command in three parties; one under Lieutenant Grover, consisting of the astronomical, magnetic, and meteorological parties, Mr. John Lambert, topographer, assisted by Mr. Strobel and the necessary men, fourteen persons in all, were sent on the steamer that plies between St. Anthony and Sauk Rapids, with directions to land on the west side of the Mississippi river, below the mouth of Sauk river, and crossing it by a good ford about a mile and a half above its mouth, establish an astronomical, magnetic, and meteorological station on the Red river trail. The directions were given to sketch in the river and make all the observations practicable for determining geographical positions and the altitude, in order to connect carefully the river with the work of the land parties; fourteen mules, two horses, and one wagon were also put on board as transportation to reach the Red river trail from the point of landing.

The second, under Lieutenant Du Barry, consisting of Mr. Stanley, Dr. Suckley, Mr. Le Frambois, the guide, a sergeant, and fourteen men, were instructed to follow on the trail of the advance parties on the left or east bank of the Mississippi, to cross the river at Sauk Rapids and encamp with the former party; the third consisting of the train in charge of Mr. Everett, the quartermaster and commissary clerk, with the same general instructions.

I accompanied Lieutenant Du Barry's command to the ferry at St. Anthony, and then went to the point whence the steamboat Governor Ramsey started, which was to convey Lieutenant Grover's party up the Mississippi. The stores, instruments, baggage, with a quantity of oats, made four heavy wagon loads. The boat got off about half-past 2 o'clock, when I went to our old camp to make the final arrangements for the moving of the remainder of the train, and late in the evening went to St. Anthony, where I left Mr. Osgood and a light wagon to await Mr. Kendall, whose arrival from New York, with numerous instruments and two India-rubber boats, was daily expected. I remained in St. Anthony till noon of June 7, to secure the services of several voyageurs, and particularly of the guide Pierre Boutineau and the hunter Menoc, in which I was successful; and starting about noon, and taking a rapid conveyance, I pushed forward the same day forty miles, overtaking at Rum river Lieutenant Du Barry, and some miles beyond both Doty and Simpson; and reaching Sauk Rapids, a distance of 30 miles further, by 11 a. m., found Mr. Tinkham actively engaged in the survey of that portion of the river. The crossing at St. Anthony is by a rope ferry, its motive power being the action of the current, having a short rope at the bow, and a longer or slack rope astern. On the west side of the Mississippi, about three miles above Rum river, there was a large encampment of Winnebago Indians, consisting of about one hundred lodges. These are constructed of oak bark, fastened by strips of buckskin over arched poles, resembling in shape the cover of a wagon; they are about eight feet high, and from ten to thirty feet long, according to the number of families to be accommodated. The chief's lodge, in the centre, is much larger, and distinguished by the flags upon it, two British and two American colors. The shores are lined with canoes, and the village extends an eighth of a mile along the river. The country, for the first seven miles after leaving camp and striking the St. Anthony road, is a wet prairie. After leaving St. Anthony the country appears to rise towards the north; the road lies on the eastern bank of the Mississippi, along the plateau, which is generally timbered with the smaller varieties of oak, in some places forming beautiful groves. The wood is, however, of little value, save for fuel. Some tamarack swamps were seen, which furnish very useful timber, while the western bank is usually a bare prairie, with occasionally scattered woods, which contain the ordinary variety of forest trees, excepting pine, which is found only at two points, just above Clear Water creek. The face of the country is undulating, and abounds in small lakes, some with sandy and gravelly bottoms, but the greater number lying in the vicinity of the route are muddy, with rich vegetation on their edges and in their midst. The plateau is cut in by many small streams running into the Mississippi, the level of the water being much below the general level, and the banks are so steep as to require cutting to pass with wagons.

The prevailing character of the Mississippi bottom from St. Anthony to Elk river is, immediately on the bank of the river, a low bottom; but a few feet above the level of the river, which terminates a short distance back in a slope which ascends to another plateau, from which a second slope, about 30 feet above the water's edge, brings us to the general level of the country. When the low bottom is absent the river encroaches upon the plateau, forming bluffs. The river averages in width about 300 yards.

June 8.—On the road and at Sauk Rapids several additional men were engaged, among them some Canadian voyageurs. These men, being sometimes half-breeds, speak a jargon of patois French, Chippewa, and other Indian dialects. They are a hardy, willing, enduring

class, inured to hardships, and used to encounter all sorts of difficulties in their journeys between different posts of the fur companies. They must be treated with kindness and a certain degree of familiarity, and, their confidence and affections being secured, they are the most obedient and hard-working fellows in the world. This morning I learned that Lieutenant Grover and his steamboat party had landed late last evening about five miles below Sauk river, and had there encamped. In the afternoon, accompanied by Boutineau, I crossed the Mississippi to find him, and went three miles in a drenching rain without reaching his position.

He had not succeeded in moving his camp to the Red river trail that day, in consequence of having only two wagons to transport four loads from the boat.

I despatched Henry Boulieau in search of Lander, and he returned with the information that Lander was about eighteen miles ahead, at Cold Spring, and that he had made there a good crossing for wagons.

June 9.—I went to Mr. Lander's camp and examined the crossing, which I found to be practicable, and the work well done. Cold spring, though only a stream of ten feet width and one foot deep, is bordered on each side by a slough full two hundred feet wide. Over this Mr. Lander had constructed a causeway of logs, filling in with willows, saplings, and mowed grass, thus forming a good wagon road across it. After dinner we rode forward to the crossing of Sauk river, which we found not at all difficult, a small party being sufficient to make it passable in a few days.

Mr. Tinkham joined Mr. Lander in the course of this day, and having decided to leave the Red river trail as soon as possible, north of White Bear lake, I issued the necessary directions for the movements of their parties in the morning.

CAMP DAVIS.

June 10.—I returned to Lieutenant Grover's camp, which was beautifully situated on the north bank of the Osakis or Sauk river, about two miles from its mouth. The grass was indifferent and backward, but, with half rations of oats, abundant for the animals; water excellent. In honor of the Secretary of War we named it Camp Davis.

Lieutenant Grover, with his party, reached Itasca at $9\frac{1}{2}$ p. m. of the day he left St. Anthony, (June 6,) where the boat laid by until daybreak. About 7 p. m. of the 7th, they were obliged to disembark on the west side of the river, about five miles below Sauk Rapids, on account of the low state of the water in the river channel. As it was late in the day, camp was immediately pitched. The landing point was on a narrow bottom, covered with a scraggy underbrush of scrub oak, vines, &c., at the base of a bluff of some 29 feet rise, also covered with the same growth, which extended back nearly a mile, and was of such a nature, that it was necessary to cut a road to the open prairie. This, together with the necessity of making two trips a day in order to push forward the stores in his charge, so delayed him that he only reached the right bank of the Sauk, near its mouth, where he encamped on the 8th in a driving rain. He crossed the Sauk the following morning at a very good ford, the only difficulty being the necessity of unloading the wagons and letting them down a very steep bank by hand. He reached camp Davis with his party safely on the 9th of June. The topography of the route was sketched in by Mr. Lambert, and observations were made by the several observers. Lieutenant Du Barry arrived this afternoon with his party, as did the small trains of Doty and

Simpson. A very severe thunder storm, with heavy rain for about five hours, occurred at night, amounting in the rain-gauge to $6\frac{1}{10}$ inches.

My acquaintance with the voyageurs, thus far, has impressed me favorably. They are thorough woodsmen, and just the men for prairie life also, going into the water as pleasantly as a spaniel, and remaining there as long as needed; stout, able-bodied, and willing to put their shoulders to the wheel whenever necessary; no slough or bog deters them.

Pierre Boutineau, engaged as our guide, I find a most useful man, to whom all the voyageurs look up with great confidence.

June 11.—A very busy day in camp. Engaged in making arrangements for pushing forward detachments next Monday. Lieutenant Grover was directed to be in readiness to take charge of an advance party. Ordered an inspection of camp, personal baggage, and property of all descriptions, by Lieutenant Du Barry.* The rear of the train, in charge of Mr. Everett, arrived within ten miles of the Rapids, and will cross to-morrow.

June 12.—Messrs. Osgood and Kendall reached camp this morning, with the barometers and India rubber boats. This mission had been performed with exemplary promptitude and success. At St. Louis, I was telegraphed that many of the barometers had been broken, and they could not be supplied short of New York. They were absolutely indispensable. I sent Mr. Kendall there immediately, and in thirty days the boats and instruments were made and brought to my camp, eighty miles on our way. Mr. Everett also arrived about noon to-day, having left Camp Pierce on the 8th instant. I regretted to observe, that many of his animals were in very bad condition. Of our whole number some forty were disabled, and eight or ten so much so, as to give very little hope that they could do any further service. I refused, however, to sell even these to the many applicants who expressed a willingness to take them off our hands, below the cost of purchase. Assembling both officers and men to-day, I caused to be read the camp regulations which I had prepared for the government of the party, and made a short address, in which I informed them that every man would be expected to look to the safety of his comrades; that all alike, whether soldier or civilian, would be expected to stand guard, and in case of difficulties to meet them promptly. I exaggerated the difficulties which lay before us, and represented that the country through which they would pass was intersected by bogs, marshes, and deep morasses; that rivers were to be forded and bridged, mountains and valleys to be crossed; that the first 180 miles of the journey was reported to be through a continuous marsh, barely practicable, where every man would have to go through mud and water, and apply his shoulders to the wheel; that in ten days we would reach the Indian country, where heavy guard duty would have to be performed to protect property and preserve lives; that still further on we would probably be compelled to force our way through the country of the Blackfoot Indians, a tribe proverbially treacherous and warlike; that then the snows of the mountains would have to be overcome, and that every man would be expected to follow wherever he might be led; that no one would be sacrificed, nor would any one be subjected to any risk, which I would not freely incur; and that whoever was not willing to co-operate with us had better at once retire. After these remarks the camp regulations were read by Mr. Kendall, and my views were cordially approved. I despatched Lieutenant Grover, with a picked party of some fifteen men, with instructions to reconnoitre carefully the country north and in the vicinity of

* See Order No. 6, vol. I, p. 46.

White Bear lake, with a view of ascertaining the point where the expedition should leave the Red river trail, and indicating that it was desirable to run from that point north of Lake Traverse to the Dead Colt Hillock, and thence to the Yellowstone. In the execution of this duty he was directed to take general charge of the advance parties in charge of Messrs. Lander and Tinkham, who were to assist him in reconnoissance, and at the same time collect the data in their departments of the work, up to the final period of departure from the Red river trail. Boulieau brought this afternoon despatches from Messrs. Lander and Tinkham, who are now together, twenty miles west of Sauk river, on the Red river trail, awaiting instructions, and Mr. Tinkham requested more voyageurs to assist in camp duties.

Mr. Lander, adverting to the severity of the sloughs, now full from the late rains, advises ropes and brush to be carried to assist in getting the wagons through them. This trip of Boulieau is worthy of notice, and entitles him to credit as a persevering and trusty man. He left our camp late last Friday evening, in search of them, and being compelled to leave his horse at the crossing of Sauk river, he waded over and walked out to their camp, some twenty miles, sleeping in the prairie, and reached it before breakfast, although he lost the trail.

June 13.—Continuing the project of sending off the train in detached parties, and thus gradually breaking up the camp, much of the day was spent in preparing a party to be placed in charge of Dr. Suckley. All was effected by 4. p. m., when his party, consisting of Belland, the guide, Menoc, a hunter, a cook, Corporal Coster, and two dragoons, with two led horses and two led mules, six pack mules, two men in charge of them, Belland's riding horse, and a Pembina cart, in charge of Henry Boulieau, started for camp.

He was instructed to follow Lieutenant Grover's trail, in slow and easy marches, looking carefully to his animals, and paying particular attention to the collections in natural history.

To-day I issued an order creating assimilated rank in the expedition, by which certain gentlemen of the party were appointed to the grade of lieutenant, and others to the grade of non-commissioned officer, for purposes of convenience in detailing guard. By this course the relative position of each man was fixed; and whether in the main or detached parties, it was known whose duty it was to give orders in case of necessity. Military organization is in some degree indispensable, and the idea of an escort has been entirely abandoned. All are soldiers in the performance of guard duty, and the soldiers accompanying us are on fatigue duty, and not merely to escort us by day and to stand guard at night. Several of the Pembina carts purchased of Dr. Borup arrived in camp to-day. Out of the four he sent we were able to make two pretty good ones. They are made entirely of wood, having no iron at all about them, very roughly constructed, and the wheels usually wrapped with raw hide or buffalo skin, in place of an iron tire, to prevent their cutting through the marshy ground so extensive between here and Pembina. They are drawn by horses, oxen, or mules, one person usually driving from two to six carts, and when loaded they will carry from six to eight hundred pounds. They look as if made for only one trip, and the creaking of the wheels on their wooden axle does not give the idea of their standing much service. Their first appearance to those of the party unaccustomed to the sight, with the oxen harnessed in them, caused much merriment; and as they moved over the prairie the singular noise produced by their wheels assured us that with such an accompaniment no need existed for any musical instruments or players, for these discoursed most sweetly.

June 14.—Spent the day in making the necessary arrangements to push forward the whole camp, to be organized for the present in detached parties, under separate heads, and all under my general direction. Lieutenant Du Barry was placed in general charge of the meteorological observations. Everything now presents a favorable aspect and all will be ready to move off to-morrow morning. The wagons are being loaded, and the distribution of weight requires care and attention. Procured several more Pembina carts, as I was able to secure only one good cart and one ox out of the four sent by Dr. Borup. Engaged to-day Paul Boulieau, a half-breed Chippewa, of collegiate education, who has filled a seat in the territorial legislature with credit, and also been long in the service of the Fur Company. In order to provide for the movement of the train and the scientific corps, which accompanied or happened to be with it, I assigned Lieutenant Du Barry, who, as already stated, had been placed in charge of the meteorological observations, to its charge as executive officer. Whilst all the reconnoitering parties and the observers, except those in special charge of Lieutenant Du Barry, received their immediate instructions from me, they were, in my absence, under his supervision, as regards discipline and police, when present with the train. The train itself was especially in charge of Mr. Osgood, and the issues of provisions were made by Sergeant Lindner of the dragoon detachment. S. P. Higgins was wagon master, and William Simpson pack master. Paul Boulieau was placed in charge of the Pembina train, so called, which, consisting at first of five carts, each drawn by an ox, was this day increased by a very superior wagon team, drawn by two yokes of very large and serviceable oxen, purchased of Captain Todd, in command of Fort Ripley. It may here be observed that the Pembina train, managed entirely by the voyageurs, invariably moved by itself, crossed all the streams without additional assistance, gave us the least trouble in supervision, and was altogether the most economical and effective transportation we had.

A pioneer wagon, containing rations for the advance party and the India rubber boats, loaded lightly, in order in case of necessity to be rapidly pushed forward to the advance parties, and a wagon of Indian goods, was with the train.

Lieutenant Du Barry, in whose instructions most of the above arrangements were specially mentioned, especially those in regard to the pioneer wagons, was directed to prepare as many of the meteorological observers for the field as possible, and make all the collections in geology, botany, and natural history in his power. I did not expect that the corps of observers, especially in the determining of altitudes, would be well prepared for their duties till they had made some hundred miles, nor that in other respects the scale of operations and the character of the work would be definitely fixed, looking always to the fact that the expedition was to reach its destination the present season. And it was fortunate that for this distance our route lay through a country generally open, and where there was no special difficulties in the way of railroad practicability.

Lieutenant Du Barry left the camp about two o'clock with the main train, and I remained behind with the observers till the next day.

The arrangements thus made left me free either to be with the advance parties or with the train, or to make personal examinations of important features of the country off the lines of the trail.

June 16.—Proceeding with the remainder of the camp, three miles from Camp Davis we passed through a belt of woods for two miles, where the flies were excessively annoying, perse-

Stanley Del

Sarony, Major & Knapp, Lith. 449 Broadway N.Y.

SAUK RIVER

cuting our animals so that it was hard to keep them in the road, as they constantly attempted to rush into the bushes. The country to Cold spring has a rich alluvial soil, with scattered groves of timber. It is mostly a level prairie, occasionally broken by a small stream, and excellent for agricultural purposes.

Cold spring is a stream of most beautifully limpid cold water, about ten feet wide and six or eight inches deep. The train and parties passing over it had made the crossing practicable, and our small party experienced no delay, but pushed on and overtook Lieutenant Du Barry at Cold stream, who, not being able to cross the Sauk to-night, encamped about four o'clock on the east side of the river. The crossing of Cold stream by the main party was effected with considerable delay and much hard work. Before coming to the boggy place, which presented the most serious obstructions, a rapid stream, about eight or ten inches deep, with steep banks, nearly two feet high, is to be crossed, on the west side of which the ground is soft, affording but little foothold for the animals. Here brush and cut grass had to be placed for a distance of some sixty yards along the bend of a very crooked stream, and there a high hill had to be ascended by the animals just after a hard pull over the soft road. Passing through Lieutenant Du Barry's camp I went on to Dr. Suckley's, on the west side of the Sauk. Sauk river (see accompanying sketch) at our ford is about 120 feet wide, though, owing to the obliquity of the banks and rapidity of current, the ford is near 300 feet wide and the water five feet deep.

June 17.—This morning I started with Dr. Suckley, leaving Evans and Kendall to come up with the pioneer wagon. We intended when leaving to encamp at Lake David, but Corporal Coster, who was ahead, passed it a mile or more before observing it, and we concluded to go on to Lake Henry, which was said to be eight miles beyond.

Lieutenant Du Barry effected the crossing of the train in one day, and encamped on the west side of the Sauk, six miles from Cold spring. The country throughout the day's march was a rolling prairie, interspersed with small sloughs, filled by the recent rains; the soil is rich and black; grass good, and occasionally gravelly hillocks. At a distance of from one to six miles to the east is a wooded ridge, evidently lining the bank of Sauk river, and apparently from sixty to one hundred feet high.

In the crossing of the Sauk by the main train the India rubber boats were, for the first time, used. The larger one is about twelve feet long and four wide, weighing seventy-five pounds, the other about one-fifth smaller. A rope was stretched across the stream and the boats ferried across by means of a ring attached to their bows and sliding along the rope. They succeeded admirably; and a birch canoe, managed by one of the voyageurs, was also used in crossing. Some of the men were in the water for hours, but worked faithfully and efficiently. The distance from the Sauk river to Lake Henry is nineteen and a half miles. The pioneer wagon came within a mile of our camp, after dark, where it remained all night. I sent back Belland to inform Lieutenant Du Barry that I intended to go forward and join the advance parties to-morrow morning.

June 18.—Fullerton, one of Tinkham's party, discharged by him, brought word that he was at Lightning lake, fifteen miles ahead. Sent back Kendall, directing Osgood to come forward to Lightning lake to-morrow with two wagons, the reserve wagon loaded with ropes, spades, a boat, &c., and that containing Indian goods. Left camp about seven o'clock, and in about three-quarters of a mile crossed a bad place, requiring some grass. The water was two feet

deep, and the bottom miry. Our road lay through a beautiful prairie. The shores of Lake Henry are heavily wooded. In two miles and a half further we found two very wet places, one hundred yards apart. In two miles further we came to a long marsh, where the ground was very soft and where our wagons stalled. By leaving the trail, however, and taking between two mounds an excellent wagon road may be secured. Three-quarters of a mile beyond, we encountered a very deep, muddy slough, to cross which we had recourse to a long rope, and all our force pulled on it. A branch of Crow river is then reached in a mile or little more. It is about twelve feet wide and two deep; both sides are overflown marsh, making the place very difficult to cross. To avoid breaking bulk we again used the long rope, and attaching three pairs of mules to it, all our men pulling on it at the same time, we got the wagon through. We arrived about noon at Crow-wing river, nine miles from camp. It was four or five feet deep and twenty feet wide where we crossed it, and at this time overflowing its usual banks. Broke bulk here, the men packing our stuff across. Near its west bank Evans found a fine spring, having a temperature of 52°, while the river was 66°, and the air at 77°. Passing Crow river we find a continuous grove of oak trees to our left, and in five miles a series of small lakes to our right, not wooded but abounding in game. Within three miles of Lightning lake we passed a large lake without name, and as Boutineau informed me that there Governor Ramsey lost his horse on the way to Pembina, we named it Ramsey lake.

Arrived at camp on Lightning lake about 8½ p. m., the train coming up an hour after. Distance travelled, eighteen and three-quarter miles. The frequent sloughs and bad crossings in our march to-day added much to the labors of the men and animals. Found that Lieutenant Grover and the other advanced parties had moved forward to Pike lake. After the hard day's march we enjoyed our supper of game, cooked in hunter's style on sticks before the fire, although it was midnight before we could have it ready.

LIGHTNING LAKE.

June 19.—*Sunday.*—Lightning lake (see accompanying sketch) is a very beautiful sheet of water; so called from the fact that during Captain Pope's expedition, while encamped here, one of those storms so fearfully violent in this country occurred, during which one of his party was instantly killed by a stroke of lightning. Its northern shore is thickly studded with timber, and the southern side, upon which we are encamped, is more thinly wooded, but affords an ample supply for all camping purposes. The water is excellent, as is also the grass. Pickerel, pike, and bass fill the lake, numbers of which our parties caught; and ducks, geese, swan, plover, and prairie chicken, abound in the vicinity. At such a camping place, we determined to spend the Sabbath and await the coming up of the wagons, which I had ordered to push ahead of the train. Received, late in the evening, a note from Lieutenant Grover, announcing that Messrs. Lander and Tinkham were encamped with him near White Bear lake; that to-morrow he would move forward to Pike lake and then reconnoitre the country in advance. Everything in camp was in good condition.

The day of rest was enjoyed by the whole party; some fishing, washing and mending their clothes, others trying various modes of cooking the game and fish which abounded. Evans succeeded admirably in roasting a fish in the ashes, first rolling it up in brown paper dampened, which, when removed, brought off the scales with it, leaving the white meat clean and well

LIGHTNING LAKE

done. Early after dinner Mr. Osgood arrived, informing me that Lieutenant Du Barry, misconstruing my instructions, had declined to allow him to bring forward the two wagons which I had ordered for the use of the advanced parties, and without which there was no use in my going ahead. I determined at once to go back myself the next morning with Boutineau, Osgood, Boulieau, and a wagon, and, as it was possible we might not get further than Crow river with the train, detailed some men to cut wood and take it to that river for the use of the party. I sent Belland forward to Lieutenant Grover to inform him of the trouble and that I would join him on Tuesday night.

June 20.—Started at 3.30 a. m. to go back to the main train, which I met five miles west of Lake Henry. Taking charge of the train myself, I directed Boutineau to explore in advance for the most practicable route. The bad crossing referred to in the narrative of the 18th was, by great exertion and the united force of the whole party, effected without accident, and the whole train reached Lightning lake by 4.30 p. m.

June 21.—In compliance with his own request I relieved Lieutenant Du Barry from duty with the expedition, and ordered him to report in person to the Adjutant General in Washington city. He was desired to call upon the Secretary of War and acquaint him with the whole history of the expedition up to this point; and to enable him to reach the settlements with some degree of comfort and expedition, I despatched Mr. Kendall and two of the voyageurs to accompany him as far as Long Prairie on his return, whence there would be no difficulty in his procuring transportation to Sauk Rapids. From Long Prairie the party were to procure some supplies and Indian ponies and overtake the expedition as soon as possible.

Captain Remenyi and his assistant, Mr. Jekelfaluzy, were discharged to-day as they did not perform their duties to my satisfaction. The baggage was weighed and each member allowed twenty-five pounds with his blankets, the excess to be turned over to the quartermaster, who would find other transportation for it. It was made the duty of each man to take out and put in the wagons his own personal baggage, and the loads were distributed accordingly.

It was here ascertained that the flour was likely to be very insufficient, as some had been damaged in crossing streams on the backs of mules, and two sacks of salt had been taken by mistake for it.

All these matters detained us until 4.30 p. m., when I pushed forward with Dr. Suckley's and the scientific parties. The clouds were gathering and indicated a severe gust. We reached a beautiful lake, about three miles distant, called by us Lake Stanley, in honor of the artist of the expedition, and had just time to get into camp to save ourselves from a very severe storm, which continued with great violence till near 7 p. m.

June 22.—My party, leaving Dr. Suckley, got off about 6 a. m. The first obstruction we met in our journey to-day occurred about three and a half miles from camp, which, our guides inform us, is a branch of Crow river. It is about twenty feet wide. The approach to it is by a marsh. The water runs very swiftly, say six or seven miles an hour. Our teams got through safely by the men applying their force to the wheels; the detention was, however, slight. One more swift, narrow, but deep stream occurs before reaching White Bear lake, offering some impediment to our progress. By the application of personal force this difficulty was

overcome without lightening the loads or even doubling teams. We arrived at White Bear lake, about nine and a half miles from this morning's camp, at $10\frac{1}{4}$ a. m.

Leaving Lightning lake the country seems to change its character and is no longer a flat, undiversified surface, with occasionally a gentle undulation scarcely attracting attention. It has gradually changed to a heavy rolling prairie which, before approaching White Bear lake, becomes broken up into hills, valleys, and basins, varying from thirty to fifty feet in depth. Boulders and stones, from the size of pebbles to paving stones, are very numerous. Our route to day appears to be gradually ascending, at a probable rate of from eight or ten feet per mile.

White Bear lake, (see accompanying sketch,) upon or near which most of the parties of the survey are encamped, lies in sight of our trail, about two miles distant to the south. It is a beautiful sheet of water, bordered with timber, about fourteen miles long and two wide, with high, swelling banks running back a mile or so, and rising to the height of about one hundred and fifty feet.

As the animals looked so fresh, and the day was cool and good for travelling, we halted only for a rest, and concluded to push forward to the next suitable point for a camping place. About five miles from the lake we came to a very heavy, severe stream, apparently running into it. The king bolt of the ambulance got broken in going through this, and occasioned considerable detention. Other bad places occured; soft bogs, marshes, and brooks, impeded our progress so much that we did not get into camp until 3 p. m., making nine and one-third miles from our halting place, and eighteen and three-quarters for our day's march.

Our camp was on a very rapid stream, with steep, high banks. We called it Lambert river, in honor of our topographer, who received a sad overturn as he crossed it with Lieutenant Grover's command.

Lieutenant Grover came back to meet us, and reached our party about 4 p. m., taking dinner with us. He informed us that his party, and that of Messrs. Tinkham and Lander were encamped at Pike lake, some five miles in advance.

The main train, in charge of Mr. Osgood, moved from the camp on Lightning lake at seven o'clock, after settling a difficulty of a very serious aspect, growing out of a strike of all the teamsters, in consequence of a discharge by him of six of their number, according to my directions, because their services were not required. They threatened to shoot the first driver who moved out of camp. Mr. Osgood declared that he would drive out each wagon himself. Finally, after some discussion, the discharged men moved off cheerfully, and the main train pushed forward to White Bear lake, where they encamped with Dr. Suckley.

June 23.—Our first labor this morning was to cross the stream at a point some half a mile from our camp, from which we moved about six. This crossing delayed our little party some two hours. Grass had to be cut and placed on both sides of the stream. At the point selected for the crossing an island had been formed, with a sort of bar running out where the stream was more shallow than in other portions of the channel. The banks were steep and soft, and it required the presence of a man or two at each wheel to keep the wagons in motion, and prevent their being stuck in the mire. Four and a quarter miles further on we found another very bad crossing at a swiftly-flowing stream, probably a tributary of the St. Peter's river. The water between the banks is about fifteen feet in width and four feet deep. The bottom was gravelly, and by mowing grass and covering the marshy borders on each side, a practicable

Stanley Del. Sarony, Major & Knapp

WHITE BEAR LAKE

Stanley Del.

PIKE LAKE.

crossing was readily obtained, over which we passed without breaking bulk. The country to-day appears admirably adapted to grazing purposes, and the bottoms, of frequent occurrence, are of a very rich and light character.

Marshes and little streams, bordered by soft places, occur frequently in the march to Pike lake. In one of these places, fully 100 feet in length, one of our wagons got mired, making it necessary to remove part of its load to get it through.

About 10 a. m. I left the train in charge of Mr. G. W. Stevens, and pushing on reached Lieutenant Grover's camp about twelve. The train arrived at half-past one, crossed a marsh and a small stream, and encamped opposite the camps of Messrs. Grover, Lander, and Tinkham.

Lieutenant Grover's camp is beautifully situated on the shores of the lake, (Pike lake.) The main train and Dr. Suckley's party arrived about half-past eight, and the whole expedition was again brought together. This I consider as the real starting point of the expedition, and named our camp here Camp Marcy, in honor of the Secretary of State. We remained here a day, in order to give the animals a chance to rest. They appear to be in very good condition, and the grazing is fine. Received of the various scientific chiefs reports of their labors to this point.

U. Bot. Garden
1909

CHAPTER II.

PIKE LAKE TO THE GRAND CÔTEAU DU MISSOURI.

Lieut. Grover directed to follow Dead Colt Hillock line.—Messrs. Lander and Tinknam sent to Chippewa river.—Abundance of game.—A strike prevented.—Instructions to Lieut. Grover to connect his line with Lieut. Donelson's survey of the Missouri.—Rendezvous appointed at Yellowstone.—Main party follows the Red River Trail.—Crossing of the Chippewa.—Lander and Tinkham sent to Pomme de Terre River.—Approach to Indian Country.—Mr. Moffett.—Anecdote.—Elbow Lake.—Rabbit River.—Severe Thunder-storm.—Bois de Sioux.—Mr. Lambert sent to Red River.—Mr. Doty to Rabbit River.—Catfish.—Bois de Sioux, commencement of Buffalo country.—General review of the country from St. Paul.—Description of Ridge dividing Mississippi and Red Rivers.—Prairie.—Crossing of the Bois de Sioux.—Excessive Heat.—Elks.—Bridging of Wild Rice River.—Severe Storm.—Arrival of Supplies and Indian Ponies.—Governor Stevens and the Engineers push forward to the Shyenne.—Train of Red River Traders —Visit to their Camp.—Crossing of the Shyenne.—Camp McClelland.—Singular mistake.—Maple River.—Fourth of July.—Signs of Buffaloes.—Antelopes.—Wolves.—Horse Butte and Butte Micheau.—Examination of the Shyenne.—Magnetic tent.—Camp Guthrie.—Gullies.—Grasshoppers.—Results of Astronomical and Magnetic Observations.—Illness of Governor Stevens.—Issue of Flour reduced.—Return of Mr. Tinkham from Butte Micheau and Lake Jessie.—False Alarm.—Immense herds of buffaloes.—The dog Jack.—Lake Jessie.—Course determined.—Running according to the compass.—Mr. Tinkham ordered to reconnoitre the Country between the Shyenne and Jacques Rivers.—Governor Stevens disabled.—James River.—Anxiety for the safety of Mr. Tinkham.—Howitzer fired.—Scouts sent out.—Water brackish.—Mosquitos.—Astronomical Observations.—Doctor Suckley's labors.—Scouts report the approach of Sioux Indians.—Alarm.—Red River Hunters.—News of Tinkham's safety.—Encampment of Red River Hunters.—Chippewa Indians.—Governor Wilkie.—Le Bombard engaged as guide.—Butte de Morale.—Origin of the name.—White Wood Lake.—Maison du Chien.—Tributary of Mouse river.—Snipes.—Approach to Côteau du Missouri.—Train of Red River hunters.—Visit.—Governor De l'Orme.—Report of Messrs. Tinkham and Moffett.

June 24.—I directed Lieutenant Grover to select a party of twenty picked men, twenty-six mules, three horses, and twenty-five days' provisions, including an ox, with which to go forward on the Dead Colt Hillock line. Towards evening they were all chosen, including Belland as guide, Davis as meteorological observer, Evelyn in charge of train, six voyageurs and teamsters, and eight dragoons, under Corporal Coster, besides Corporal Cunningham, to run the compass line. In thus giving to Lieutenant Grover his own selection of animals and men, my purpose was to make him in the highest degree effective in the means at his disposal, and to demonstrate, by the success of his undertaking, the entire feasibility of operating in detached parties. Messrs. Lander and Tinkham, with their parties, moved forward this afternoon to Chippewa river, the former to stretch a rope across and prepare his canoe for crossing.

On counting rations, it was found that for the main party there was a supply for twenty days, while it might take forty-five to reach Fort Union. But with the eight oxen in the carts, and the known abundance of game, I feared no scarcity. The men showed some anxiety and talked of a strike, but, seeing the confidence of the officers, abandoned any open demonstration. Previous to this time I had ordered a reducing of rations whenever the quantity of game would justify it, and henceforward I gave the most particular attention to it, so that, although we did not reach the Yellowstone for thirty-eight days, (August 1,) there was at no time a scarcity of provisions.

June 25.—To-day the expedition may be considered fairly under way. Lieutenant Grover started at 7.30 a. m., with instructions to leave Pike lake at this point, cross the Bois de Sioux

near Lake Travers, and proceeding in the general direction of Dead Colt Hillock, continuing to the mouth of the Yellowstone, making the best survey of the country that the means placed at his disposal would furnish, and connect his line with Lieutenant Donelson's survey of the Missouri at some eligible point, as at Fort Berthold; the point, however, to be selected being left to his discretion. He was provided with a Schmalcalder's compass, an odometer, and the necessary meteorological instruments for the altitude. I expressed the hope that he would reach the Yellowstone before me, and directed that every opportunity of communicating with me should be availed of.

The main party, under my own direction, (and guided by Boutineau,) moved forward at about the same time. Still continuing on the Red river trail, in two miles from camp we came to a running stream two and a half feet deep, with marshy banks, making it difficult for the animals to obtain foothold, and on the west side a continuous bog, on which all the grass had been burnt off. Here two wagons were stalled, but the men cheerfully put their shoulders to the wheel, and after a little delay brought them to the firm ground. The balance of the train leaving the trail found a ridge about a quarter of a mile to the north which avoided the difficulty. In ten miles reached the Chippewa river. The riding animals were crossed over the Chippewa, and also the teams without their loads, by following a bar running well down the stream, the entrance to and exit from the stream being two hundred yards apart along the river. The India-rubber boats did good service, carrying over each time more than half a wagon load. The whole train was all well encamped two miles further on, at a fine lake, by sunset.

Much of our march to-day was made entirely out of sight of wood, and the last few miles, before reaching the Chippewa, the country was indifferent and the grass thin and poor. Crossing the Chippewa, we again find a rich soil and excellent grass. Lakes bordered by wood are still numerous, which furnished our hunters with abundance of geese, ducks, &c. The gentlemen of the scientific corps and myself reached camp about three o'clock; soon after which I sent forward Lander and Tinkham to the Pomme de Terre river.

June 26.—The main party moved to-day to the camp of Mr. Tinkham of last night; the head of the column reached the river at eleven o'clock, and the whole command was over and in camp by six o'clock. This river is the Pomme de Terre of Pope's map, but Boutineau says it is the Chippewa, that which we crossed yesterday being one of its branches. As we were now approaching the Indian country, I systematized all the arrangements of camp and guards and the details of duty on the march. The dragoons were distributed as follows: two for the pack train; two, with a led horse each, for reconnoitering duty; two to strike and pitch tents; two to catch fish; two with the howitzer; the sergeant Lindner, and seven men with the main column. The sergeant was, moreover, charged with the duty of laying out the encampment, under my direction. For the care of the camp an officer of the guard, who also served as officer of the day, two non-commissioned officers, and six privates were detailed.

Cook fires to be made at two o'clock a. m.; the cooks and teamsters called at three, and the animals to be put in good grass; reveille to be sounded at four, and all the officers to be called by name; the whole camp to breakfast about four, and the teamsters immediately to commence harnessing up; tents struck at half-past four, and camp in motion by five; the sentinels instructed to fire upon any prowling Indians.

The following anecdote illustrates the good feeling and zeal which prevailed in the camp, and the disposition to derive amusement even from the execution of laborious duties.

Mr .Moffett, who, since Lieutenant Du Barry's departure, has been in charge of meteorological observations, with the rank of lieutenant, was to-night officer of the guard. He is one of the most inflexible men in the party, rigidly interpreting orders, and making the most strenuous efforts to discharge his duties. He never enters upon anything without a determination fully to perform it, having a certain pride in his peculiar mode of doing so, and in guard duty seems to take an especial pleasure. At sundown the guard was summoned to report to their officers. He paraded them outside the line, showed them the position of the various posts, and addressed them in a speech, in which he enjoined them to be on the alert, although we did not apprehend any danger. "Your chief duty will be to watch the animals within camp" (here came a pause, he dreading to mention Indians,) "and *without*." The speech over, they were ordered to get into line, and Corporals Gear and Evans accompanying, paraded them around camp, Farnham whistling the ever-memorable Yankee Doodle. From a line they were ordered to get into double file, and in this way were marched up to my tent, and reported ready for duty.

June 27.—Camp roused at 4 a. m. While at breakfast Lieutenant Moffett gave me notice that we had but "four minutes left to eat in;" and as we failed to get through, he had the tents struck over our heads.

The train moved at five o'clock. About eight miles from camp passed Elbow lake, so called, and most appropriately too, by Major Wood. After a march of fourteen miles over an excellent road reached the Rabbit river of Captain Pope's map, (which Boutineau insists is the Pomme de Terre.) The crossing of the river at the trail is quite difficult, the stream deep, and bad ground on both sides. We therefore followed the stream to where it empties into Bell's lake; and then going along the beach through water eight inches deep, with a pebbly bottom, we found a good crossing, though a ridge has to be ascended before getting upon the plain where our camp was placed. The grass is most excellent, and the animals, now accustomed to each other, are visibly improving. Here we have our last wood before reaching the Bois de Sioux.

Sent out Mr. Lambert on a short reconnoissance towards the north, when he had the misfortune to loose his Schmalcalder's compass, and, though diligently sought for by him the next day, it was not found. A severe thunder-storm occured this afternoon. Our hunters brought into camp a small quantity of game—a sand-hill crane and three ducks.

Tuesday, *June* 28.—We were delayed an hour this morning in getting off. Within two and a half miles of camp two marshy places occurred, beyond which was a broad belt of level prairie extending north and south as far as the eye could reach. At 10½ a. m. the advance had crossed Rabbit river, fifteen miles from camp, and halted till the arrival of the main train. Leaving the train to rest, the advance started at 2½ p. m., and in three miles met Mr. Lander, whose camp was with Mr. Tinkham's, on the Bois de Sioux. Continuing on, we went into camp at 5 o'clock, about three-fourths of a mile from the engineers' camp, and were joined by the whole party at 9 o'clock, after a march of 27 miles over a country which had been invariably reported the very worst of the whole route. Our animals, though somewhat tired, immediately went to feeding. There were some soft places between the Rabbit river and the Bois de Sioux, in which

the animals were mired and wagons stalled; but we were agreeably disappointed in having, comparatively, a very comfortable day's journey.

From our morning's camp I sent Lambert to Red river, with four men, to reconnoitre along its course to the Bois de Sioux, and thence along the latter stream to our evening's camp; and from Rabbit river I despatched Mr. Doty and two men to follow the Babbit river some eight or ten miles, thence, crossing on a line about parallel to our trail, to the Bois de Sioux, to follow down the latter stream to camp.

Numerous large catfish were caught this afternoon, some weighing from 12 to 20 pounds. At 11½ p. m. we sat down to a supper of ducks, catfish, and coffee, and all the men were in fine spirits. The Bois de Sioux had been a great point to reach—the end of bad roads and the commencement of the buffalo country. It is quite a large stream, is well lined with wood, and the drift deposits on its banks indicate that during spring freshets a considerable portion of the prairie is submerged.

Here we may make a general review of the country passed over since leaving St. Paul.

Between Camp Pierce and Sauk Rapids, 79 miles, the road passes through beautiful prairies and oak openings, with occasional meadows, wet at this early season, and, at some distance to the right, groves of tamarack, varying the landscape with their light and feathery foliage.

The entire country on the east side of the Mississippi, from St. Paul to Little Falls, presents facilities for railway construction seldom, if ever, exceeded; one hundred and twenty miles of level or slightly rolling gravel prairie supersedes all necessity for ballasting, &c.

From the crossing at Sauk Rapids to Lightning lake, where the party was divided, most of the country is rolling prairie, with the wooded banks of Sauk river on the south, and numerous small ponds and lakes, with trees on their banks, abundant and excellent pasture, and swarms of water-fowl supplying plenty of fresh provisions.

A similar delightful country continues to the Bois de Sioux river, with some decrease in the amount of timber, until the banks of that river are reached.

After leaving Lightning lake the country seems to change its character; no longer a flat undiversified surface, or with gentle undulations scarcely attracting notice, it has gradually changed to a heavy rolling prairie, and, at White Bear lake, becomes broken up into hills, valleys, and basins. Boulders and smaller stones are numerous. At a distance of thirty miles toward the north of our line the route from Little Falls to the Bois de Sioux is represented as passing over high sandy plateaux, broken by low ridges and interspersed with shallow swamps; the upland country is well timbered with the eastern pine, and the swamps well filled with excellent cedar.

This whole dividing ridge, then, separating the waters of the Mississippi from those of the Red river, which flow into Hudson Bay, is not the lofty range of mountains which might be supposed to separate the sources of two such great bodies of water, flowing in opposite directions and to outlets so widely distant, but is a gently undulating and exceedingly rich prairie country, abundantly wooded and watered, having a width of one hundred miles, and an elevation not exceeding 600 feet above the river and about 1,600 above the sea. There is a very slight rise in the general level in going westward, the Bois de Sioux being, at the crossing, only 31 feet higher than the Mississippi at Sauk Rapids. Undulating and level prairies, skirted by woods of various growth, and clothed everywhere with rich verdure; numerous and rapid streams, with

innumerable small but limpid lakes, frequented by multitudes of water-fowl, most conspicuous among which appears the stately swan—these, in ever-recurring succession, make up the panorama of this extensive district, which may be said to be everywhere fertile, beautiful, and inviting.

The most remarkable features of this region are the intervals of level prairie, especially that near the bend of the branches of Red river, where the horizon is as unbroken as that of a calm sea. Nor are other points of resemblance wanting; the long grass, which in such places is unusually rank, bending gracefully to the passing breeze as it sweeps along the plain, gives the idea of waves, (as, indeed, they are,) and the solitary horseman on the horizon is so indistinctly seen as to complete the picture by the suggestion of a sail, raising the first feeling of novel to a character of wonder and delight. The flowing outlines of the rolling prairies are br a only by the small lakes and patches of timber, which relieve them of monotony and enl e their beauty; and though marshes and sloughs occur, they are too small and unfrequent to t the generally attractive character of the country. The elevation of the rolling prai s generally so uniform that even the summits between streams flowing in opposite dire ns exhibit no peculiar features to distinguish them from the ordinary character of the valley slopes.

BOIS DE SIOUX.

Wednesday, June 29.—The advance parties crossed the river before 7 o'clock, but the train was not started till 11, so as to give the animals rest. The ford, very good for a small train, became very muddy toward the last; and though we unloaded all the wagons and carried over the loads in boats, the wagons and animals were badly stalled at the edges and on the soft and steep banks of the river. The country from the Bois de Sioux to the Wild Rice river is a broad, level prairie, covered with luxuriant grass eighteen inches high. The distance on our trail, eleven miles, with occasional sloughs. The heat to-day was excessive, and the mosquitos very annoying to men and animals. At 4 o'clock, profiting by our experience in crossing the Bois de Sioux, I sent Mr. Lander with a select force of axe-men to cut timber to bridge the Wild Rice. The train came up slowly; the last wagons not reaching camp till midnight. Several elk were seen this morning and fired at by Boutineau without success.

Mr. Adams, who had been sent from our morning's camp to examine the Bois de Sioux to the site selected by Major Woods for a military post, thence to cross over to Wild Rice river, and continue up to the evening's camp, made his appearance about 6 a. m., having acquitted himself very handsomely of this duty.

Thursday, June 30.—Part of the men were employed in carefully currying and washing the animals and in catching fish. Every one in camp at work, the remainder were detailed to build the bridge, which was completed by 1 p. m. It was made of heavy logs, filled in with cut willow brush and mown grass. Moved at 2 o'clock, taking wood along for an evening's camp. In three miles came to a small creek, eight feet wide and two feet deep, a branch of the Wild Rice river, which was quite marshy, and caused delay to cross. Moving one mile and a half further, we again struck the same stream, and encamped at 4½ p. m. Here was excellent grass and water, but no wood on the side we were on. Portions of the country travelled over to-day are subject to overflow in spring freshets, as is shown by the water lines on the banks of the

Stanley Del.

BOIS DE SIOUX RIVER

streams and the deposits on the route. During our march to-day we encountered a very severe storm, accompanied with thunder and lightning. Boutineau brought in an elk, which furnished about two pounds of excellent fresh meat to each man, and was much enjoyed. Kendall and the two Boulieaus overtook us to-day, bringing supplies and five Indian ponies.

July 1.—I determined to push forward with the engineer party to the Shyenne, and, if I found it necessary, have it bridged. Smooth prairie extended all the way; road good, and the distance 26½ miles.

A very severe thunder-storm occurred this morning, lasting an hour, and wetting us thoroughly. At 11 a. m. we met the train of the Red river traders, in charge of Mr. Kittson, and visited their camp, six miles distant, in company with Dr. Suckley, Messrs. Stanley, Osgood, Boutineau, Menoc, and others. We were very hospitably received, purchased some pemmican, common moccasins, and articles of dress worked with porcupine quills. Bought, also, some carts and oxen, being very deficient in transportation.

The main train only proceeded 13 miles, and I returned to them about 3 p. m., accompanied by Kittson, Father Delacour, Roulet, and Cavilaer. Kittson and Roulet were members of the territorial legislature from Pembina; Cavilaer, the collector of customs; and Delacour is a very clever, shrewd priest. They are on their annual trip to St. Paul with robes, skins, pemmican, and dried meat of the buffalo, collected by trading with the half-breeds of the Red river settlements. We found that they had bridged the Shyenne, saving us considerable trouble and delay. Their company proved very agreeable, and we were glad that a heavy thunder-storm coming on obliged them to be our guests for the night.

July 2.—Struck camp at 7 o'clock and parted with our new friends, sending back with them Strobel and two teamsters, who proved inefficient.

The whole train crossed the Shyenne bridge safely by noon, and camped on the other side. We had apprehended that possibly the heavy rain of last night would swell the river and carry away the bridge, but hurrying up the wagons we made the crossing just before the water had risen sufficiently to flow over the bridge. I called this Camp McClelland, intending to halt here over Sunday and make up despatches for Washington. I sent Lander and Tinkham to reconnoitre both up and down the river.

July 3.—*Sunday.*—Lander came back from his reconnoissance, having been as far south as Dead Colt Hillock.

He met with a singular adventure, which it may be well to chronicle, and which afforded us a great deal of amusement. Riding along with his four voyageurs, whom he used to call his "men of iron," at some distance ahead they saw a skunk moving leisurely through the grass, with tail erect, and defying their approach. Lander levelled his glass at it, and satisfying himself that it was an Indian watching their movements and trying to hide himself, gave the order for his gallant band to "charge." They did charge, and at the same time firing their revolvers, the poor skunk fell riddled with balls and weltering in his blood; when coming up, they discovered the extent of their bold exploit. Joking in camp is one of the pastimes to relieve the annoyances of the march, and every little thing is seized upon to feed the disposition. For the past few days the good idea of Mr. Everett, with his old black umbrella, the only arm he carries, has furnished the material for considerable merriment.

Fourth of July.—The train started at 6 a. m. I remained behind to get off a mail, and the

engineers remained with me. From them I received the necessary reports, and in a letter stated the general character of the route up to this point. After giving an account of the expedition to Pike lake, I wrote: "Lieutenant Grover moved on the morning of the 25th ultimo, in fine spirits, determined to distinguish himself. I was then confident, and am still, that he will pass over a fine route. It is almost an irresistible inference, from the general course of the streams, as laid down on Nicollet's map. His instructions are to push forward to the Yellowstone, touching, if possible, the Missouri, to connect with Lieutenant Donelson's survey.

"I moved also, on the 25th, with the main train, and crossed the Shyenne early on Saturday morning, (July 2.) We have moved rapidly to day, making to the next wood a march of 27 miles. We bridged the Wild Rice river, and found a good bridge at the Shyenne, the work of our Red river friends.

"The train is now in motion, and I am behind to make up a mail—the last till I reach the Yellowstone. We shall cross the Shyenne the second time a few miles north of Bald Hillock creek, and shall pass within fifteen or twenty miles of the Miniwaken lake. Thence our course will be nearly straight. With my reconnoitering force I hope to cover a broad belt of country, connecting with Lieutenant Grover's route. The accompanying sketch (one prepared by Mr. Lambert embracing results to this point) will show the character of our work. It is all the result of careful observation. The work north of the route, on the Bois de Sioux, Wild Rice, and Red rivers, was done in a single day by Mr. Adams, a young gentleman attached to the civil engineer's party; that west of our present camp, on the Shyenne, by Mr. Lander, one of my civil engineers, assisted by Mr. Adams and one man. Mr. Lander left this camp on Saturday afternoon (July 2) at 4 o'clock, and returned last evening, a little after 8, having ridden over, and carefully observed, at least 80 miles of country in 28 hours.

"By a comparison with Nicollet's map it will be seen that the course of the Shyenne at its southern bend is much out of the way, and I have determined to have its southern shore carefully examined by Mr. Lander. He will accordingly start to-day with Mr. Adams and four picked men on this duty, and will be instructed to explore carefully the region along, and south and west of the Shyenne river, connecting, if possible, with Lieutenant Grover's route. He has choice animals, and spare horses for reconnoitering. I entertain no apprehensions as to hostile Indians. He will join me south of the Miniwakan lake.

"The sketch indicates the course of Lieutenant Grover and my proposed course to the second crossing of the Shyenne river, and the relative positions of the two routes to the direct course from the Sauk crossing to the mouth of the Yellowstone.

"The country, thus far, is exceedingly favorable for a railroad, no grade over forty feet to the mile. The Shyenne is a great obstacle, and the indications are very decided that the line must go south. I have indicated a particular railroad route. Without equipment it will not cost over twenty thousand dollars per mile. No important deflection is made. The crossing of the Shyenne at this point will cost say one hundred thousand dollars; twenty miles west, at the point marked on the sketch, not fifty thousand. The general line will, undoubtedly, be better; but when I reach the Yellowstone, and have Lieutenant Grover's route before me, I shall be able to report more definitely on this portion of the route."

Mr. Lander, with Mr. Adams and four picked men, was accordingly instructed to examine

Stanley Del.

Sarony, Major & Knapp, Lith. 449 Broadway N.Y.

MAPLE RIVER.

the Shyenne river and the country south and west of its great bend, so as to cover the whole ground between our route and Lieutenant Grover's. He was expected to rejoin us in six or eight days south of Miniwakan lake.

Got off about 10 and followed the Red River trail some twelve miles, when we left it altogether. Crossed Maple river and camped on it banks, about half a mile from our crossing.—(See accompanying sketch.)

It would be an excellent plan for an emigrant travelling through the country, before reaching one of these rivers on which he expects to camp, to catch a few frogs, for the purpose of fishing in these streams, which abound in pike, pickerel, and large catfish. Frogs are by far the best bait that can be used.

About dusk we raised the American flag, made of white and red shirts contributed by the party and sewed together by Boulieau. As it went up the assembled command gave it three hearty cheers, and then indulged in some refreshments in honor of the day, ending the evening with songs and story telling.

July 5.—Travelled twenty miles over a high, firm, and almost level prairie, more rolling, and with small salt ponds in the last seven miles, camping on a small branch of Maple river, without any wood near it. Saw signs of buffalo, but the hunters were out all day and got none. The pack train requiring more attention and care of the animals than has been given by the man in charge, who does not take sufficient pains with the disabled animals, I, to-day, directed Mr. Kendall to oversee them and have them properly attended to.

July 6.—Went twenty miles further, making a noon halt of two hours, when Mr. Tinkham returned from a long and rapid reconnoissance ahead, without any change of the scenery. Prairie more rolling, but road good. A high butte to the left of our course enabled me to get a fine view of the surrounding country.

Two Indians were seen by Boutineau, who was out after buffalo, which he did not find; but abundance of ducks continue to supply the camp with fresh meat.

July 7.—Before starting Henry Boulieau came into camp leading his mule, having walked forty miles since sunset yesterday, and leaving Sergeant Rummell behind. I sent back a led horse for him, and though I urged Boulieau to rest he preferred starting off again with Mr. Tinkham, who was sent out to reconnoitre. His mule he brought in safely. Rummell's was entirely broken down.

On our march to-day the characteristic formation of the country was limestone, and in many places the ground and incrustations on the stone indicate the presence of iron. About 8½ we struck the Shyenne, about six miles from camp, and rested an hour. Keeping the Shyenne on our left we moved forward some ten miles and camped about a mile and a half from the river on the banks of a fine lake. Here the grass was fine and the water good; but there being no wood I sent a wagon to the banks of the river and had a load brought, which was distributed among the various messes. To-day Le Frambois and Menoc killed an old buffalo bull, and also brought in some dozen geese. Several of the messes supplied themselves with frogs, which have been most abundant on our march for the past two days. The whole command took supper off of buffalo, and the meat, though old and tough, tasted very good, and saved us an ox which had been destined for the slaughter. Several antelopes and wolves were seen to-day.

SHYENNE RIVER.

July 8.—Started this morning at $6\frac{1}{2}$ and arrived at the crossing of the Shyenne river after a march of about fifteen miles. Buttes in considerable number are seen ahead, among which the Horse Butte and Butte Micheau are plainly visible, Mr. Tinkham, Paul, and Henry were out again to-day, making a reconnoissance on the Shyenne. They came in early, having made a very satisfactory examination. We went into camp about one o'clock, on the east and south side of the Shyenne, (see accompanying sketch,) and a party was at once detailed to cut wood and prepare charcoal.

The magnetic tent was put up and the astronomical and meteorological parties went immediately to work. I called our camp Camp Guthrie, in honor of the Secretary of the Treasury, and determined to remain here all day to-morrow. As the grass here is very indifferent, the main train will cross the river to-morrow afternoon and go ahead some six miles to good grass, while I shall remain with the magnetic party. Travelling along the côteau of the Shyenne, near the place where we encamped, I saw a buffalo, to which Menoc and La Frambois gave chase, but without success. The plateau of the river, and the coulée opening into it, is observable to-day. Extensive gullies are here found making into the prairie on the one side and the plateau of the river on the other. I descended from the côteau some 150 feet and camped on the plateau alluded to. The grass, at the best, is very poor, and the great abundance of grasshoppers had made sad havoc with what had grown here. This afternoon Mr. Tinkham, Paul Boulieau, and Rummell went ahead to fix the position of Butte Micheau, Lake Jessie, and to make a reconnoissance of the road. Boutineau found a very good ford some half mile from our camp, which needed but little levelling of the steep side banks to make it entirely practicable for our wagons.

The astronomical and magnetic observations of the survey have not, as yet, furnished any satisfactory results. The rates of the chronometers have increased, and no satisfactory data have been obtained by which our longitude can be computed. I feel very anxious on this subject, as I wish to have verified our dead reckoning, as well as determine our position. These unsuccessful results have not been owing to any neglect or indolence on the part of Mr. G. W. Stevens, or his assistant, Mr. Doty. Their time has been fully occupied; they have worked assiduously and overcome many practical difficulties. They have made many very good observations, and but few computations remain to be brought up.

Boutineau and Henry Boulieau went out this afternoon, and returned with the choice pieces of a fine fat young buffalo bull, and we made a delightful meal around the fire of the hunters' mess of the ribs, marrow bones, &c., cooked hunters' fashion.

Towards evening, on the côteau on the other side of the river, a herd of some twenty elks made their appearance. Numerous wolves were also seen, which, during the night, kept up a constant howling.

We planted flags on high hills in the vicinity, as signals to Lander, who may follow the Shyenne river to find our crossing place.

July 9.—Feeling quite unwell I remained in bed most of the day. An accurate return was made of the provisions on hand, so as to regulate its weekly distribution. Our flour is fast diminishing, and the issue was reduced to half a pound per day to each man. This state of

Stanley Del.

SHYENNE RIVER.

HERD OF BISON NEAR LAKE JESSIE.

affairs caused considerable grumbling in camp. We are fast approaching the buffalo country, and then shall be expected to do with much less. About $2\frac{1}{2}$ p. m. the main train, under Mr. Osgood, crossed the river without unloading any of the wagons or doubling the teams, and moved forward to a good camping place, carrying with them a supply of firewood, as none would be found again before reaching Lake Jessie. The astronomical, magnetic, and meteorological parties, with the detail of three men attending to the coal pit, and Mr. Evans and myself, remained at Camp Guthrie, intending to join them before they moved on in the morning, and breakfast with them.

About 3 p. m. Mr. Tinkham came into camp and reported that he had been to the Butte Micheau and Lake Jessie. They found buffalo to be very numerous on our route. Paul Boulieau and Rummell killed some four or five coming back, without going out of the way.

About dusk Paul started ahead for the camp of Mr. Osgood, and having crossed the river, he commenced singing an Indian song, which Joe said was in the Sioux language. Lemere and Mechall, another voyageur, came running in, and loudly proclaimed that we had but a few minutes left; that we were surrounded by the Sioux. Most of the gentlemen assured them that it was only Paul singing; but Joe knew better; he could tell Chippewa from Sioux, and the song was in the Sioux language. The camp was in commotion, and every arm was inspected and loaded, though I endeavored to laugh it off as a good joke. Myself and Evans determined to stand guard, and directed the men to go to bed. Evans went on about 11 o'clock, and continued up the balance of the night, awaking the camp at 3. Grass was cut from the bottoms near by, and the animals were put together as closely as possible, so as to abridge the watch duties. The two frightened men never got over their apprehensions. They would neither go to bed nor approach the camp fires, feeling certain that they would become marks for the Indians, and would not go on guard at all. Evans reported that they were most vigilant and watchful sentinels. I sat up till 12 o'clock, engaged with Messrs. Stevens and Doty in the examination of the astronomical observations, formulæ, &c.

July 10.—Most of our camp arose at $2\frac{1}{2}$ o'clock. After partaking of a cup of coffee at 3 o'clock, our little train, consisting of an ambulance and spring wagons, with a cart loaded with charcoal, had crossed the Shyenne by sunrise. The ambulance, or instrument wagon, being too heavily loaded, was detained on the west side some half hour, in consequence of the soft state of the ground preventing the animals from securing a good foothold. About 7 o'clock we reached the main train, encamped some seven miles off. The train was preparing to move, and soon after we came up it started. At 8 o'clock we followed and passed them. About five miles from camp we ascended to the top of a high hill, and for a great distance ahead every square mile seemed to have a herd of buffalo upon it. Their number was variously estimated by the members of the party—some as high as half a million. I do not think it is any exaggeration to set it down at 200,000. I had heard of the myriads of these animals inhabiting these plains, but I could not realize the truth of these accounts till to-day, when they surpassed anything I could have imagined from the accounts which I had received. The reader will form a better idea of this scene from the accompanying sketch, taken by Mr. Stanley on the ground, than from any description.

The timber bordering on Lake Jessie was distinctly visible ahead, and between us and it were countless herds of buffalo, through which we were compelled to pass. The train moved

on till 11 o'clock, when we all halted, drew up into line, and picketed the loose animals. About half a mile ahead a large herd was to be seen. Six of the hunters, Boutineau, Menoc, Le Frambois, the two Boulieaus, and Rummell were mounted upon the best horses in the command, some of which were specially reserved, and rode off in fine style, keeping together till ready to dash in among the herd. The immense sea of flesh remained quiet until their approach, and then separating, they rode in among them, selected the fat cows, and riding around until the proper time to do execution, the quick succession of shots announced the fact that our supplies of meat were fast being added to. In less than an hour a wagon or two was called into requisition to collect the choice pieces of nine buffalo cows. While we were resting several small bands came within firing distance of our train. One or two dragoons, on foot, gave one a chase, but the buffalo of course distanced them. The most amusing scene was the dog Zach, of the dragoon detachment, dashing into a whole herd and following them a considerable distance. We arrived at Lake Jessie about 3 o'clock p. m., the bluff shore on which we encamped being some sixty-four feet above the level of the lake, (see accompanying sketch.) Paul Boulieau and Rummell were both thrown by their horses stumbling in one of the numerous holes with which the prairie abounds. They were considerably, though not seriously, hurt. The water of Lake Jessie is considerably saline in its character, but about three-fourths of a mile from camp an excellent spring of good fresh water was found by Henry Boulieau and myself while out on a reconnoitring trip. This discovery afforded a pleasant relief from the brackish water of Lake Jessie and the surrounding lakes.

This is the last point on the trail at which our work will connect with Nicollet's survey, and to-night our camp is pitched upon the same spot where he encamped some sixteen years ago.

Between 1 and 2 o'clock at night a herd of buffalo approached our camp, and it required all the exertion of the guard, assisted by many of the men, to prevent an entire stampede of all our animals. As it was, some got loose, though none were lost. The buffalo were followed a considerable distance, and some ten or a dozen shots were fired before the animals without were entirely driven off.

July 11.—Fearing that the water in advance of the party would prove to be of the same character as that which we had left behind, I ordered two casks to be filled with spring water. Lake Jessie being the last point of Nicollet, I instructed Mr. Tinkham's party to run a line of levels, and Mr. Morfett to make corresponding barometrical observations to verify the work, thus securing a good profile of the country we go over.

Having proceeded about four miles, a small band of buffalo started off ahead of us. Le Frambois's horse and four loose mules near the head of the column started in pursuit, the horse taking the lead. Boutineau, Le Frambois, Menoc, Guy, Lindner, and Paul Boulieau, (who, though laboring under severe indisposition from yesterday's throw, and had ridden in the ambulance up to this point, insisted on going,) all well mounted, gave chase in hopes of recovering them. But by this time they had mixed up in the herd, and though they were followed some twelve or fifteen miles, their efforts were entirely unavailing. About a mile further we encountered a very severe slough, the approach to which was marked by a very great curiosity, in the form of a buffalo trail; at least 100,000 must have crossed here by the foot prints and marks visible, and I determined on crossing the slough at the same point which the instinct of these animals had selected.

[illegible]

Our whole march to-day was only ten miles, and we reached camp about 5 o'clock. Our camp was beautifully surrounded by hills, the grazing excellent, and the water passably good. A high hill overlooked our camp, to the top of which Tinkham, Lambert, Boutineau, and myself went to reconnoitre the country ahead to determine the line of our march to-morrow.

July 12.— In company with Tinkham and some of the guides I started from camp this morning at 5 o'clock, designing to be in advance of the train some miles to reconnoitre and pick out a good road, our route lying over high hills. The main train did not get off until after 7 o'clock, being delayed by the repairing of an axle of a wagon broken yesterday.

From the reconnoissance of yesterday evening from the hill near the camp I observed two ranges of hills, with a plateau between, which I concluded to be the dividing ridge of the tributaries of the Jacques and Shyenne rivers, and I resolved to change our course so as to strike for the plateau. I therefore determined our course N. 85° W., with instructions to Boutineau to keep in advance and point out the way, which was not to be abandoned except in crossing sloughs, and then to return immediately. This is the first day we have run according to the compass, and it succeeded admirably.

At about 8 o'clock I sent off Mr. Tinkham, accompanied by the two Boulicaus, well mounted, with instructions to go southward, determining the position of the headwaters of Bald Hillock creek, and thus connecting his work with Mr. Lander's reconnoissance; thence westward in a line nearly parallel with our route of to-day, making a reconnoissance of the tributaries of the Jacques river, leaving it to his own discretion whether to join our camp to-night or the next day. By this we would secure the reconnoissance of a belt of country forty miles wide, lying between the Shyenne and Jacques rivers.

About eleven miles from camp we crossed a deep slough. The water here being good the train stopped an hour and lunched. About a mile further on we crossed a fine little stream, which I took to be Beaver Lodge creek. Shortly afterwards Boutineau killed a fine buffalo cow, not twenty feet from the compass line. The despatch and dexterity with which these men cut up buffalo is truly astonishing. Before the train came up the animal was entirely butchered, and had only to be thrown in the cart.

We moved forward to-day some sixteen miles, and encamped on the side of a small lake. The water and grass were both very good, but there was a scarcity of wood. We had scarcely got into camp before we were visited by a very severe storm, accompanied by thunder and lightning. Our fires were put out by the rain, and during a temporary cessation were built up again; but it soon came on with increased violence, and our fires were again washed out. About 6 o'clock two of Mr. Lander's party who left us on the 4th arrived in camp, announcing that Mr. Lander and the rest of his men were only some three or four miles behind, with considerable difficulty bringing in the horses, which were giving out. I despatched two men with led horses to meet them, and about sundown they came up. We found great difficulty in keeping up our fires so as to get our supper cooked. The rain fell in torrents; our supply of wood was limited, and the buffalo chips were so wet as to be entirely useless. Mr. Lander's party had only fifteen pounds of flour when they started, and for some days had lived exclusively upon game. On the evening of the 8th they saw a large buffalo bull, the first one they had seen, and immediately Mr. Lander and three men started in pursuit. The bull distanced the tired horses, with the exception of the blood mare ridden by Mr. Lander, who overtook and

killed the animal with his revolver, after considerable struggle, the bull running on him twice. On the party reaching him, one of the horses took fright at the sight of the dead buffalo. He was followed all night by Augustus Lebat, the balance of the party going into camp, and by Mr. Lander and Lebat all the next day and night, the other animals and men embracing the opportunity to recruit, which they so much needed. After every effort to recover the animal without success, they abandoned the pursuit, rejoined the little party, and pressed forward to overtake the train. The killing of the first buffalo by the expedition belongs to Mr. Lander, it being one day previous to the killing by Menoc of one on our train. They packed as much of the meat as possible, and when it became exhausted they collected the refuse meat abandoned at our various camping places. One of the horses brought in was entirely worn out, and the men were very much fatigued. After supper I engaged some time in conversation with Lander and Adams, and then had Boutineau and Lambert visit our tent, and by a consultation with our maps determined on taking, as the course to-morrow, N. 80° W., in order to strike a point thought by Boutineau to be some eight miles north of a large hill some eighty miles beyond here—an excellent landmark, of which Boutineau asserted his knowledge. This hill must be the Maison du Chien, and is visible some thirty miles.

Towards the close of the day's march I became disabled from my exertions in endeavoring to keep off a herd of buffalo from the train, causing an old wound to break out, which compelled me to ride many hundred miles in the ambulance.

July 13.—A very heavy fog this morning delayed our getting off as early as expected, and the hope of Tinkham and his small party joining us made me less hurried about starting. We were encamped on the banks of a lake, being almost entirely surrounded by sloughs; to avoid which we had to make a considerable detour. About 11 miles from camp we made a halt on the banks of a slough, where we lunched. Our road to-day is over a level plateau, one or two sloughs interrupting our progress, but causing no serious delay. Just before coming to our noon halt we found a large patch of strawberries, from which the men were enabled to gather a considerable mess. Sixteen miles from camp we struck James river, and crossed over a good ford, from which point I sent Mr. Lander down the river to examine it. Noticing that the river ran very nearly in the course of our compass, we followed it, and again crossing it some five miles above we encamped. The engineer party with the odometer did not cross the river, but pursued the compass course. Boutineau accompanied them, to get them through a bad slough in the line. We arrived in camp about 5½ o'clock, and Le Frambois was sent to the engineer party to direct them to join us in camp, which was about three-fourths of a mile above their line. Both the fords of this river which we crossed were excellent; but between the two the water was in some places very deep, while at others it widened out until it almost resembled a lake, the current running about a mile an hour. Along the banks the grass is very indifferent, and in many places there is an abundance of large pebble stones. At the fords the bottom is gravel and pebbles, while in the deep places a clay mud seems to prevail.

At our camping place the grass is good, the water passably so, and wood scarce. Early after encamping I had a large amount of rushes collected, with a view of building as large a camp fire as practicable, in order to give notice to Tinkham of our position, he not having returned.

July 14.—The missing party not having arrived, three rounds of the howitzer were fired at sunrise, and we started later than usual. It was evident that the whole camp was in a great

state of anxiety for the safety of our comrades. Many believed that they had fallen in with Indians, and were deprived of their horses and their lives; others thought that the exposure without blankets or food had probably caused the sickness of some member of the little band; others feared their animals had stampeded, and that the party were delayed by endeavoring to recover them; some thought that they had crossed our trail, faint as it was in some places, and being unable to determine our course were possibly moving still further from us.

Taking everything into consideration, I deemed it best to leave a party at this point so equipped as to combine great energy and force with promptness of movement, so as to be able to overtake the main train without difficulty. Accordingly, Mr. Lander was left in charge of the engineer wagon and the wagon belonging to the mountain howitzer, which were made light enough to be moved with ease 40 miles in a single day. The howitzer was also left with him for the purpose of making signals. Mr. Doty, with three voyageurs, and three men to manage the howitzer, together with the teamsters of the ammunition wagon, remain with Mr. Lander, having abundance of arms, provisions, animals, &c., to supply any emergency.

This party was instructed to keep up fires, to fire three rounds with the howitzer at noon and at sunset should the party not arrive, and communicate with us if any casualty occurred.

A party of four brave and thorough woodsmen, whose knowledge of the prairie life was derived from experience in many expeditions, and who well understood the Indian character, were sent out on the route travelled yesterday, and were directed, after travelling some ten or twelve miles, to leave the road, and going in different directions, plant signals and scour the country. I felt certain that Mr. Tinkham and his party would be found by these men if found at all.

The remainder of the train left about 7 o'clock, pursuing the same course as yesterday. The first ten miles was over a level plateau. We met with but one slough which presented any obstruction to our march. Our mid-day halt was on a high hill, in sight of a large herd of buffalo, which the hunters pursued, and succeeded in killing two fine cows. The wagon had to go only some half mile off for the meat. Parties were sent out to collect buffalo skulls and ribs, and twigs of the grease wood, which abounded in several places along the route. The twigs were made into bundles and thrown into the lightly loaded wagons. About six miles from the halting place we came to a long marsh or slough, in which the engineer wagon got bogged. The others, pursuing a different route, passed through with some difficulty.

After travelling sixteen miles we came to a considerable quantity of brush, much larger than that above alluded to. Here we stopped to rest the animals, and while they were feeding all the command were engaged in collecting fuel. In a short time we had sufficient for to-night and to-morrow morning. We moved on and encamped about 4½ o'clock at the bank of a fine lake, having made to-day a distance of little over 20 miles. The grass was excellent, but the water was very indifferent; it was slightly brackish, and had to be strained before being used. This has been the character of the water for the past few days, and has affected both animals and men; many are now taking opiates to correct the purgative effects produced by drinking it. The Shyenne river is said to be only some eight or nine miles ahead, and if a good crossing or camping place is found on it, we will move forward to it.

The mosquitos are exceedingly annoying, flying against the sides of the tents with a noise

like the pattering of rain, while the inside is perfectly black with them. Their constant humming drove the men out into the open air, and rendered it almost impossible to sleep.

July 15.—At daybreak Broadwell went back to Lander's camp, and I despatched Osgood and Kendall to a high hill to reconnoitre and look for a new camp. The guides and hunters were also sent on to the Shyenne to ascertain the distance, and if not too far we would go to it. Being very unwell I laid by all the morning, and the delay of the train was employed in shoeing the animals, equalizing loads, and arranging them in such a manner as to give about 900 pounds to each wagon, and so distributed in bulk that a portion of each wagon could be appropriated to the conveyance of wood and the meat killed each day.

I feel encouraged in regard to the astronomical observations by the industry of Mr. Stevens, and his confidence in his own success.

The men are much interested in the labors of Dr. Suckley, the naturalist. It is amusing to see each one making his contribution of snakes, reptiles, birds, bugs, &c.

Near noon Osgood and his party returned, having been to the Shyenne, where they found no wood, poor grass, and swarms of mosquitos. Soon after the guides returned, announcing that they had seen a party of Sioux of 1,000 lodges, not more than nine miles in advance of us. Boutineau's manner was full of fear, and his public announcement spread alarm through the whole camp. I at once gave orders to make ready, with the intention of visiting their camp; and calling Boutineau to my tent, asked him whether they were not the Red river hunting party. He assured me indignantly that "he knew half-breeds from Indians, and that they were certainly Sioux."

I suggested that they might be friendly Sioux, who, being engaged in the hunt and hearing of our approach, were coming forward to meet us, to receive the usual presents and gratify their curiosity. He still insisted that they were hostile Sioux, and saw in their presence the explanation of the cause of the absence of the missing party. We were, in his opinion, to be surrounded and cut off.

After dinner, as the alarm was spreading throughout the command, the arms were inspected and ammunition distributed, and orders given to have the train in readiness to move at once. I sent Boutineau, Le Frambois, and Menoc to the top of a high ridge as a lookout, while a flag was prepared to be sent forward if necessary.

Word soon came that the country was alive with Indians, who were fast surrounding us; and I sent scouts to hills on the right and left, having the lake to protect our rear. Mounting my horse I rode to the hill in front, and saw two horsemen rapidly approaching. Our flag-bearers rode forward to meet them, and soon discovered that they were two of the Red river hunters, and that their camp was three miles beyond the Shyenne. Having discerned our party, they came to invite us to visit them, and express their kindly feelings for us.

The train, which, before this, was in motion, arranged in a double line with the pack and loose animals between, proceeded two miles, where there was better water, and encamped.

The agreeable disappointment established a fine feeling throughout camp; and half an hour after Boulieau and Lindner arrived in camp with news of Tinkham's safety, which was received with three cheers.

The men to-day showed a good spirit, and, although there was naturally some anxiety, they obeyed every order with alacrity.

Stanley del. Sarony Major & Knapp Lith. 449 Broadway N.Y.

CAMP RED RIVER HUNTERS

Thus ended the apprehensions of the command concerning Indians, and was the first and last difficulty of the kind which occurred in camp on the trip.

RED RIVER HUNTERS.

July 16.—Awaited the coming up of the back parties, and during the morning Tinkham arrived and was received with nine cheers, being followed soon after by the rest of the rear guard. About 2 p. m. the whole Red river train came in sight, and, as they approached, fired a succession of volleys of firearms as a salute, which we returned with three rounds from the howitzer. The train consisted of 824 carts, about 1,200 animals, and 1,300 persons, men, women, and children, the whole presenting a very fine appearance.

They encamped near by, and the close yard which they formed presented quite a contrast to the open camp adopted by us. They make a circular or square yard of the carts, placed side by side with the hubs adjoining, presenting a barrier impassable either to man or beast. The tents or lodges were arranged within, at a distance of about twenty feet from the carts, and were of a conical shape, built of poles covered with skins, with an opening at the top for the passage of smoke and for ventilation. They were 104 in number, being occupied generally by two families, averaging about ten persons to the lodge. Skins were spread over the tops of the carts. and underneath many of the train found comfortable lodging places, (see accompanying sketch.)

The animals were allowed to run loose during the day to feed, but were driven into the corral at dark. Thirty-six of the men are posted as sentinels, remaining on guard all night. We have but twelve guards, three reliefs, not more than four men being on guard at one time.

As our camps were only about two hundred yards apart, there was much visiting between them. I was struck with the good conduct and hospitable kindness of these people. A small band of Prairie Chippewa Indians, who accompanied this party, visited our camp during the evening, and entertained us with one of their national dances.

I was much pleased with Governor Wilkie, who is the head of the expedition. He is a man of about sixty years of age, of fine appearance and pleasant manners. This party are residents of Pembina and its vicinity. When at home they are engaged in agriculture, raising wheat, corn, potatoés, and barley. The land yields about twenty-five bushels of wheat to the acre, their farms averaging about 15 acres each. They are industrious and frugal in their habits, are mostly of the Romish persuasion, leading a virtuous and pious life. They are generally accompanied by their priests, and attend strictly to their devotions, having exercises every Sabbath, on which they day they neither march nor hunt.

Their municipal government is of a parochial character, being divided into five parishes, each one being presided over by an officer called the captain of the parish. These captains of the parish retain their authority while in the settlement. On departing for the hunt they select a man from the whole number, who is styled governor of the hunt, who takes charge of the party, regulates its movement, acts as referee in all cases where any differences arise between the members in regard to game or other matters, and takes command in case of difficulty with the Indians.

In the early part of the year, till the middle of June, these people work at agriculture, when they set out on their first hunt, leaving some thirty at the settlements in charge of their farms,

houses, stock, &c. They start out to the southward in search after buffalo, taking with them their families, carts, animals, &c. These carts, when loaded, contain about 800 pounds, and are used in common. There were 336 men in the present train, of whom over 300 were hunters. Each hunt, of which there are two every year, continues about two months, the first starting in June, the second about the middle of October. Their carts were already half full, and they expected to return to their homes in the latter part of August. On their first trip the buffalo are hunted for the purpose of procuring pemmican, dried meat, tongues, &c.; the skins, being useless for robes, are dressed for lodge skins, moccasins, &c. In October the meat is still better and fatter, and they procure a like quantity of dried meat, reserving sufficient for a year's provision, which is about one-half of the whole amount procured; they dispose of the rest at the trading posts of the Hudson Bay Company.

The meat which they carry home finds its way, through the Red river traders of the Fur Company, to Fort Snelling, where it is exchanged for goods, sugar, coffee, &c., at the rate of fifteen cents a pound.

The trade of this company is all in dry goods, sugar, tea, ammunition, &c. Notes are also issued by the Hudson Bay Company, which are currency among them. Several of these, of the denomination of five shillings, payable at York Factory, and bearing the signature of Sir George Simpson, were offered in change to various members of the expedition on purchasing various articles.

The skins collected in the summer hunt are usually retained by the hunters for their own use, while the robes collected in the fall hunt are a staple of trade with the Fur Company, and also with the Hudson Bay Company, which latter company do a large business in this portion of the country, supplying the settlers with most of their clothes, groceries, &c.

The Red river settlements are made up of a population of half-breeds, traders of the Hudson Bay and Fur Companies, discharged employés of these companies, and Indians, representatives of every nation of Europe, Scotch, Irish, English, Canadians, and speaking a jargon made up of these dialects, intermingled with Chippewa and Sioux, patois French being the prevailing tongue.

These settlements, started some twenty-five years since, now number, in the vicinity of Pembina mountain, some four thousand people. The men are generally much finer looking than the women. On the latter depend all the drudgery of camp duties, pitching the tents, attending to animals, cooking, &c.

The men dress usually in woollens of various colors. The coat generally worn, called the Hudson Bay coat, has a capot attached to it. The belts are finely knit, of differently colored wool or worsted yarn, and are worn after the manner of sashes. Their powder horn and shot bag, attached to bands finely embroidered with beads or worked with porcupine quills, are worn across each shoulder, making an X before and behind. Many also have a tobacco pouch strung to their sashes, in which is tobacco mixed with kini-kinick, (dried bark of the osier willow scraped fine,) a fire steel, punk, and several flints. Add to these paraphernalia a gun, and a good idea will be formed of the costume of the Red river hunter.

The women are industrious, dress in gaudy calicoes, are fond of beads and finery, and are remarkably apt at making bead work, moccasins, sewing, &c.

We purchased from the train a supply of pemmican, dried meat, sugar, and other things, some of the men buying moccasins, whips, and other necessaries.

I engaged the service of Alexis Le Bombard, who was in company with this encampment, as guide to the Yellowstone. He is represented as having a thorough knowledge of the country, which was apparent from his conversation. He came from the Yellowstone this season, and the impression gathered from my interview with him, as well as the representations of others, satisfied me that he will be extremely valuable as a guide.

Shortly after the Indians left, Governor Wilkie and several of the principal men came over to my tent. I had a very pleasant conversation with them in regard to the Indians, hunting, &c. During the conversation, I made some inquiries as to their views concerning the establishment of a military post in this vicinity, say at Lake Miniwakan. The suggestion met with their hearty approval, and Governor Wilkie assured me that were one located there, the people would remove and settle near it, cultivating sufficient land to keep the post supplied with vegetables and provisions. Governor Wilkie dined with us, after which the train prepared to move, and at 2¼ p. m., accompanied by our new guide, Le Bombard, we bade adieu to our Red river friends and moved forward on their trail. Our guide avoided crossing the Shyenne by going around one of its bends, and after travelling ten miles, which we accomplished with ease in two hours and a quarter, we reached a good camping place on the side of a lake where the grass was excellent.

Sergeant Lindner and Mr. Bixby followed our compass course as far as the Shyenne river, which they crossed forty rods from the compass line, finding a good ford for wagons, the water being not more than eighteen inches or two feet deep. On either side, the banks were of gradual declivity, and the country afforded a good road for wagons, although there was some high land.

July 18.—Started a few minutes before 7, still following the trail of the Red river train. The odometer wagon and meteorological party follow the compass line. About 8 o'clock we crossed a branch of the Shyenne, flowing through a deep valley with an extended plateau, bounded on both sides by the high côteau. This stream appears to take its rise in a number of small lakes, and the branch crossed this morning is slightly brackish. Many of the lakes are very salt. These appear to have no outlet, and their saline qualities are accounted for by the fact that they are never washed out, and consequently retain the salt deposits and incrustations. We often notice in this region that lakes lying very close to each other, in some cases not more than twenty yards apart, one will be so saline as to be offensive, while the water of the other will be excellent to the taste.

This morning Mr. Lander and private Lawless were sent to the northward of the compass line, with instructions to proceed until they reached the Shyenne river, thence to pursue a course in the general direction of the odometer line, about the usual march, and then join us in camp.

Mr. Tinkham, accompanied by Corporal Rummell, was directed to go southward some five or six miles, and then pursue a line of reconnoissance nearly parallel to the travelled route to-day, keeping in sight of the train. He would strike the Shyenne above the place forded by the train and join the camp at night.

We passed to-day a narrow lake, some three miles in length, somewhat resembling a canal.

It lay at at the foot of a high hill or butte, called the Butte de Morale, (see accompanying sketch.) Here occurred an engagement between some half-breeds and Sioux, in which one of the former, by the name of Morale, was killed; hence its name. The altitude of this butte, as determined by barometric measurement, is 281.8 feet above the level of the Shyenne river.

Our way was strewn by the carcasses of many buffaloes, killed by the Red river hunting party. At times the air was very much tainted. One of our men reported having rode through a section of land, some quarter of a mile square, on which were strewn the remains of some three hundred buffaloes. In killing these animals, the choice pieces and hides are only taken, while the remainder is left as a prey to wolves or to rot on the prairie.

We had wood to-day for the first time since leaving Lake Jessie, on the 11th instant. Our fuel in the mean time consisting of twigs of greasewood and buffalo chips. The sight of a camp fire of wood is quite a treat to us.

Our camp is beautifully located on a range of hills, nearly surrounded with salt lakes. An excellent spring near by furnishes us an abundant supply of cold fresh water. These lakes are called the White Wood lakes.

Mr. Lander arrived in camp about 3½ o'clock, and reported having crossed a branch of the Shyenne, and after passing over eleven miles of flat country again met the Shyenne, which at that point assumed a more serious character as a railroad crossing, the channel between the banks being about one hundred feet deep. He joined the compass line three and a half miles from camp, where he met a lake full seven miles in length.

Mr. Tinkham did not come in until about 6½, having travelled over much more country than I expected.

The odometer line measured to-day was twenty and a half miles; that pursued by the train was probably two miles longer.

July 19.—Moved camp about 6½. The engineer wagon, being loaded lightly, followed the compass course, only varying from it to avoid impassable sloughs or obstructions and then returning to the line immediately. Our course lay over a level country, meeting some small sloughs, which were passed with little difficulty. After proceeding ten miles, we crossed a branch of the Shyenne river, at this time very shallow; but the high banks on each side, together with the grass and deposits, gave evidence of its size during the freshet in the spring. After travelling sixteen and a half miles we encamped near a small lake, in sight of the Maison du Chien, which, by bearings and calculation, Mr. Tinkham estimated to be about twenty-one miles distant.

We passed on the march several salt marshes abounding with tadpoles, from which the effluvia was very offensive. Frogs also appeared in myriads. In some places the ground was covered with deposits of salt to the depth of a quarter of an inch.

I am much pleased with our new guide, Le Bombard, who appears to have a very accurate knowledge of the country, although his ideas of distance are not found to be very reliable, which is generally the case with voyageurs.

July 20—Fitted out Lander's party, consisting of himself, Le Frambois, Guy, and Rummell, with a pack mule, to make a reconnoissance of Butte Maison du Chien and the Côteau du Missouri, to connect our work with Lieutenant Grover's survey, and join us on the Mouse river in four days.

Stanley del.

Sarony Major & Knapp Lith. 449 Broadway N.Y.

BUTTE DE MORALE

We moved off about half-past six, and after travelling about five miles reached the first tributary of the Mouse river. The stream was very deep, being much swollen by a heavy rain which, judging from appearances, must have taken place a day or two ago. The crossing occupied nearly three hours, the water being shoulder deep; half the wagon loads were removed and carried across in the India rubber boat.

The road was generally very good, passing over a level prairie intersected with lakes and sloughs, but presenting no difficulty to our passage. About twelve miles from camp, we struck a beautiful ridge, resembling a railroad embankment, which lay directly in our compass course; on the top of this the train moved for some miles. We passed around the first coulée of the Mouse river, and after a march of some seventeen miles to avoid sloughs, &c, (odometer measurement 15.7 miles,) encamped on the bank of a small lake.

We estimate our distance from the point where we will strike Mouse river to be between five and six miles, and by calculation of angles about seventeen miles northeast of the Maison du Chien butte. The marshes surrounding our camp abound in ducks, and for the first time on our trip we met with a beautiful variety of the snipe family, (white, with fawn colored heads,) several species of which the doctor preserved.

July 21.—Left camp at 6 a. m. It commenced raining about 9 and lasted an hour or more. About eight miles from camp we saw the tracks of Grover's train in a slough, by which we judged that he had passed some days previous. Soon after this we crossed one of the coulées making into Mouse river. These coulées are very severe on the animals, in some places being very steep; the bottoms at the base are probably one hundred and fifty feet wide, while the distance apart at the top may be some fifteen hundred. In these bottoms we generally find a stream or indication of a river channel. Various marks give evidence tnat there are times when considerable volumes of water pass through these conduits. We passed large excavations made at different places by the violent action of the water. The configuration of the valleys of the Mouse river and its tributaries resemble the Shyenne. High ridges dividing the plateaux, the one bordering the stream, and the other extending into the prairie with the coulée. About eleven, Boutineau brought me intelligence of the position of one of Grover's camps, and from the indications by fire and other marks he must have passed by some four days in advance of us. Desiring to connect his survey with ours, after arriving at camp Mr. Adams, with an odometer wagon, was despatched to the place where Grover's camp was located. On his return, he reported that Lieutenant Grover had struck the plateau of the river to avoid crossing the coulées, and had passed along between our line and the river, a mile or so from us, and that his camp was about seven miles from ours.

We travelled to-day 16 miles. Our camp is located on the top of a ridge, which descended into a coulée. We are about 150 feet above the valley of Mouse river. There is plenty of timber in the coulée, which we are to cross to-morrow in starting.

July 22.—Left camp about 6½ o'clock, and found the crossing of the coulée about a half mile to our left. On the other side of the coulée we have a fine, level plateau ahead. The Grand Côteau du Missouri was in sight all day. The depth of the first coulée, as indicated by the barometer, was some 82 feet below our camp. About four miles from camp, we crossed another severe coulée, 108 feet below the level of our camp. The third coulée was a depression of 54 feet, the prairie level being some 42 feet lower than the level of our last camp.

While making our usual mid-day halt we were overtaken by two hunters of the Red river

train, from the vicinity of the Selkirk settlement, who were encamped some eight miles distant. They invited me to visit them, which I determined upon doing, and placing the train under the charge of Dr. Suckley, I gave him directions to move on some eight miles, find a good camping place, and await my return. All the men were to be set to work as soon as they got into camp, and none were to be permitted to visit the Red river train. Mr. Tinkham and an assistant were to go to Mouse river, and Mr. Moffett and an assistant were to be despatched to the Grand Côteau and make a profile of the country.

July 23.—During my absence this morning Dr. Suckley sent ahead Le Bombard and Sergeant Lindner some twelve miles, to reconnoitre for a good road for the train; Messrs. Tinkham and Burr went to the Mouse river, and Mr. Moffett, accompanied by Broadwell, went to the Grand Côteau.

I sent Guy and Rummell ahead to Dr. Suckley's camp, to apprise him of our coming. At about 4 o'clock, accompanied by Governer de L'Orme and seven of his principal men, we started towards Dr. Suckley's camp. The whole force of the survey, headed by Dr. Suckley, Sergeant Lindner bearing an American flag, met us about a mile out of camp, and saluted us with a volley from their guns, the mountain howitzer being fired three times. A large tent was put up for the accommodation of our guests, and Governer de L'Orme was invited to share my tent. The guard tent was taken and made use of as a banqueting room, and several of the men were detailed to collect buffalo chips. The cooks of the various messes were assisting each other, and the meal was ready for us about 9 o'clock. Tinkham and Burr got in just in time to partake of it with us, as also did Moffett and Broadwell. Mr. Moffett reported the height of the bluff or Côteau range as 702 feet above the level of Mouse river, and distant 20 miles from it; the height of the hill seven miles from the camp of to-day is 256 feet.

Seated around the camp fire between the two tents we had a very pleasant conference with our friends. I was very favorably impressed with Governor de L'Orme, and with his opinion, as well as that of his associates, in regard to their right to hunt on our territory, they being residents of the country north of our boundary line. They claim the protection of both governments, and the doubt as to the position of the boundary line makes them ignorant as to which one they have the most claim upon. During the hunting season they carry with them their families and their property, and they consider that this territory is open to them; that the right to hunt on it belongs to them, and that their children born during this transit over our soil possess the heritage of American citizens. Strongly impressed in favor of American institutions, they wish to be noticed by our government, and feel a desire to meet and confer with a commissioner sent by it to treat with them. My own opinion is, that while they possess no fee simple in the soil yet they have the same right and title which our government has acknowledged the Indian tribes to possess—a right of occupation, with the view of hunting, &c. With but little care our government could obtain the whole of these people as citizens, thus protecting and building up our frontier, and having in this vicinity always a controlling check upon the Indians. Already is the salutary effect of their presence visible in the entire safety, now, with which single white men and small parties can go through this country. Their virtuous mode of life; their industry and frugality; their adaptation to frontier life, all combine to render them a valuable class of people, and well worthy the attention of our government. They expressed a desire that I should represent these things to the government, and I assured them that I would do so with pleasure. Governor de L'Orme, before retiring to rest, attended to his devotions, and I have been struck with his piety and real goodness, manifested in his conduct and conversation.

CHAPTER III.

THE CÔTEAU DU MISSOURI TO FORT UNION.

Departure of Governor de L'Orme.—Tinkham and Boulieau sent to Mouse River and the River of the Lakes.—Le Bombard prepares map and itinerary.—Mr. Osgood starts for Fort Union.—Instructions sent to Lieutenant Grover.—To Lieutenant Donelson.—Letter from Mr. Osgood.—Encampment of Assiniboine Indians.—Blue Thunder and Little Thunder.—The Pipe of Peace.—Address of an Old Chief.—Reply of Governor Stevens.—Speech of the Old Brave.—Vaccination.—Origin of the word Assiniboine.—Mr. Lander sent out to the Pierced Rocks.—Mr. Burr in charge of the Barometrical, Dr. Suckley of the Geological Observations.—Boulieau and Le Frambois remain in the Assiniboine camp to collect statistics and prepare a vocabulary.—White Earth River.—Le Bombard sent to Fort Union.—His return.—In sight of Fort Union.—Lieutenants Grover and Donelson meet the party.—Arrival at Fort Union.—Good condition of the animals.—Lieutenant Grover's route.—Leaves Pike Lake.—Crosses two forks of the Chippewa River.—The Pomme de Terre.—Description of country from Pike Lake to Lake Traverse.—Lake Traverse.—Rabbit River.—Bois de Sioux.—Wild Rice river.—Lightning's Nest.—Jacques or James river.—The Grand Côteau.—The two Terraces.—Shyenne River.—Reaches Fort Union.—Lieutenant Donelson's route.—Survey of the Missouri.—Steamboat Robert Campbell.—Plan of making the survey.—Hourly soundings.—Omissions supplied from preceding surveys.—Loss of part of his notes.—Description of the Missouri from Saint Louis to the mouth of the Kansas.—Soil.—Velocity of river.—Sand bars.—Snags.—Sawyers.—Permanent obstructions.—From the Kansas to mouth of the Platte.—Its banks.—Width and velocity.—Its tortuous course at Saint Joseph.—From the Platte to Fort Pierre.—The banks fertile as far as L'Eau Qui Court.—Shoals and rapids.—Dangerous for navigation.—From Fort Pierre to White Earth River.—Exceedingly tortuous course.—Snags and bars.—Cedars.—Width at Fort Union.—Its banks at Fort Clark and Fort Berthold.—Picturesque appearance at the Bluffs.—Return of the Robert Campbell.—Exploration of the country north of Fort Union.—General review of the route.—From Saint Paul to Fort Union.—Rate of travel.—Limestone abundant.—Indications of the presence of iron.—Terraces and ridges.—Ponds and marshes.—Dividing Côteau.—Second crossing of the Shyenne.—James River.—Lake Jessie and other Salt Lakes.—Mouse River and its valley.—Riviere des Lacs.—The Grand Côteau.—Its general elevation.—Plateau between the Missouri and Red Rivers.—Vegetation scanty.—Wild turnips.—Despatch and presents sent from Fort Union to the Blackfeet.—Their answer to Mr. Culbertson.—Fort Union.—Its situation and history.—Mechanics at the Fort.—Mr. Culbertson and his wife.—Preparations for the continuation of the survey.—Zealous co-operation of Fur Company.—Mr. Lander reaches Fort Union.—Disposition of the party.—Spread of bugbear stories.—Presents to the Assiniboines.—Arrival of the steamer Saint Ange from Saint Louis.—Mr. Everett sent to Washington.—His return a matter of necessity.—Lieutenant Donelson starts towards Cypress Mountain.—Lieutenant Grover continues the usual Wagon Road to Fort Benton.—Governor Stevens leaves a letter for Doctor Evans, not yet returned from the Mauvaises Terres.

July 24.—We took a late breakfast this morning, and after parting with our guests we got off at 9 a. m. We halted for two hours at noon, during which time the hunters went out and drove a herd of buffaloes towards us, and right on the line killed two fine cows. The wagons did not have to go twenty yards out of the way to get the meat. I sent Mr. Tinkham and Paul Boulieau out to the Mouse river, which they followed some distance, as also the River of the Lakes, joining us at camp at 8 p. m. We made $15\frac{1}{4}$ miles to-day, and the grazing to-night is excellent. From conversation with Le Bombard to-night, I think the distance to Fort Union cannot be over 150 miles. At my request he prepared a map of the country ahead, and an itinerary of the route, making it in seven journeys.

July 25.—The express started this morning at six a. m., accompanying the train some five or six miles. It consists of Mr. Osgood, Boutineau, Henry Boulieau, and Gray. They are to procure additional wagons or carts at Fort Union, to aid in transportation to Fort Benton. By

it I sent a letter to Lieutenant Grover, congratulating him on his preceding me into Fort Union; giving him a resumé of our labors up to this point; informing him as to Mr. Osgood's duty, and alluding briefly to the continuance of our labors towards the mountains. I instructed him to have his report ready on my arrival, and informed him that Mr. Osgood would confer freely with him; expressing much confidence in his ability to furnish valuable suggestions, based upon the experience he must have undoubtedly acquired. A letter was also sent to Lieutenant Donelson by Osgood, announcing to him my approach, and the date of my expected arrival. I informed him that I desired his views of the mode of conducting the survey to and through the mountains, hoping that he had collected much valuable information; he was also instructed to furnish Mr. Osgood certain of the detachment of sappers, to assist in the preparation of the means of transportation. He was informed that the duty of preparing transportation was placed in the hands of Mr. Osgood, and that he would therefore turn over to him all the animals he had collected.

Messrs. Tinkham, Lander, and Paul Boulieau, went to-day to make an examination of the Mouse river valley and the River of the Lakes. They are to look carefully for coals and iron, and to see what quantities are likely to be supplied, and join our camp to-morrow night. The road to day was excellent, being over a rolling prairie, at times very hilly. We had but one coulée to cross, and that was very shallow and offered no impediment. We made to-day 21 miles, and found fine grass and excellent water at our camp. Lieutenant Grover's trail has crossed our route several times to-day, and passes only some twenty rods from our camp.

July 26.—We started this morning about 6 o'clock, and travelling 11½ miles we halted on the bank of a lake. A herd of buffalo approached on the south side of this lake to drink, and crossed within gunshot on the opposite side. Some of our party fired at them, and Le Bombard followed and killed a fine, fat cow. About seven miles further on, I received a letter from Mr. Osgood, by the hands of an Assiniboine Indian. The express party camped last night, about ten miles ahead of this place where we camp to-night, at a large encampment of Aissiniboine Indians, numbering 150 lodges and some 1,200 persons. The Indians built for them a lodge in the centre of their camp, and treated them with great hospitality. One of them offered to act as Mr. Osgood's express, and he told them that on my arrival I would have a talk with them and make them some presents. By this note I also learned that Lieutenant Grover had passed some eight miles to the east of our line, about four days ago.

Here were four men received kindly and treated well in a camp containing 1,200 persons, and an express volunteered. I felt very grateful indeed to those Indians, for their kindness to my men, their proffer of kind feeling and hospitality to myself and the survey. I reflected much upon the commentary thus given on the remarks constantly being made about the intentions of the Indians.

As we passed an old encampment of the Indians to-day, we found numerous bundles of light wood tied up, and as we did not expect to reach wood very soon, the men were ordered to place a lot of it in the wagons. I learned from the Indian, who remained with us all night, that Grover had a Sioux Indian as a guide. I determined upon visiting the Assiniboine camp to-morrow, and consequently the Indian was retained as a guide to that point. I sent Lambert and Moffett in advance some five or six miles to a high ridge, to make a reconnoissance and obtain a barometric profile.

Lander, Tinkham, and Paul returned this evening. They had made a reconnoissance of some twenty miles along the River of the Lakes, but had not ascertained its source. No information had been gained in regard to coal. I accordingly determined to have a bolder and more thorough examination made, on leaving the Assiniboine camp.

ASSINIBOINE CAMP.

July 27.—Reaching camp a little after noon, fifteen miles from last night's camp, and about a quarter of a mile from that of the Assiniboines, numbers of Indians rode out to welcome us. The first one came toward us with the back of his uplifted hand toward us, as a signal of friendship, and then they shook hands with every man of our party.

We found them to be under the command of the chiefs Blue Thunder and Little Thunder, the latter probably 36 years of age. As soon as we were encamped, they informed me that they had reserved a present of skins for me, and were making preparations to have a talk. While dinner was being prepared many seated themselves in squads around the tents, smoking with he men. One large pipe served a dozen, and the custom adopted is to smoke a little and pass it to their neighbor, and thus go around. It is the first signal of welcome or friendship after the hand is offered, and they will have no business or other transaction previous to it.

One of the Indians handed me a note from Lieutenant Grover, dated the 21st, stating that he would be at Fort Union by the 25th.

After dinner, accompanied by Dr. Suckley, Messrs. Stanley, Lander, Tinkham, Everett, Evans, Adams, Menoc, with Paul Boulieau, Le Bombard and Le Frambois as interpreters, I went over to their camp, which was irregularly arranged in a sort of corral, consisting of about 150 lodges, averaging ten persons to each lodge.

Our approach was hailed by the barking of an immense number of dogs. These dogs are a prominent feature in every Indian camp, being used for drawing lodges, provisions, and property, from place to place, indeed furnishing the entire transportation of the Indians in winter. A sledge drawn by four dogs will carry two hundred pounds over the snow with great ease.

They appeared, also, to be abundantly supplied with horses, many of which were of good quality. All the women and children turned out of the lodges as we passed, curious to see us. Frames of poles stood around, upon which skins and meat were drying. Yet, in spite of the appearance of plenty, all had a look of poverty, judging from the meagreness of clothing and the length of time it appeared to have been worn, while all appeared very filthy and miserable.

A very large lodge, about fifty feet in diameter, had been erected for our reception in the centre of the enclosure, within which we found seated two circles of chiefs, braves, warriors, and others. At the back of the lodge was arranged a long seat for us, consisting of a pile of skins, which were afterwards presented to me.

There were about eighty persons present, including our own party. During the preparation for the ceremonial reception there was a general smoking among all present, during which an old man, one of the dignitaries of the tribe, prepared the pipe of reception, only smoked on great occasions. The stem was decked with ribbons of various colors, and when it stood obliquely feathers would drop down like the wing of a bird. At the lower end of this pipe, where it enters the bowl, was a duck's head. The pipe stem was supported against a small stick stuck in the ground and crotched at the end. The pipe was turned towards the sun, the

invariable practice in such cases. Some sweet grass, platted, was then set on fire and used in the manner of incense, both to the bowl and the stem. After lighting the pipe with the scented grass it was planted near by in a small hole and burned.

Preceding the smoking the bearer of the pipe shook hands with each member of our party, handing the pipe after this ceremony was over. Then a bowl of water was handed around by a second individual, who also shook hands with each one of us, before we drank of the contents of the bowl. Next came the eating of soup, made of buffalo and Typsina, a species of turnip, which was rich and greasy but quite palatable.

Soon after this ceremony, which completed the reception, an old man advanced to me and shook hands, after which he shook the hand of each member of our company. His appearance was much in his favor, carrying himself with great dignity. With considerable fluency, and, at times, with many gestures, he addressed me substantially as follows:

"My father, the Great Master of Life made us all for good purposes. He had a design when he made me. I have not yet fulfilled his wishes; but before I die, though an old man, I hope to be able to do something for my people.

"My father, we are glad to see you here to-day to hear from the Great Father afar off, who sent you. We have never yet been taken under his protection, nor experienced his kindness. We are glad of this opportunity to show our own kind feelings towards him, and we hope the peace now commenced may last forever.

"My father, you see us now as we are. We are poor; we have but few blankets and little clothing. The Great Father of Life who made us and gave us these lands to live upon, made the buffalo and other game to afford us subsistence; their meat is our only food; with their skins we clothe ourselves and build our houses. They are our only means of life—food, fuel, and clothing. But I fear we will soon be deprived of these; starvation and cold will destroy us. The buffalo are fast disappearing and before many years will be destroyed. As the white man advances, our means of life grow less. We will soon have to seek protection in our poverty from the Great Father, who can so well supply it.

"My father, we hear that a great road is to be made through our country. We do not know what this is for; we do not understand it; but I think it will drive away the buffalo. We like to see our white brothers; we like to give them the hand of friendship, but we know that as they come our game goes back. What are we to do?"

Again shaking hands with all of us he sat down, and after a short interval of silence the chief, through his interpreter, signified a desire to hear me reply, which I did, in substance, as follows:

"I am happy to meet you this day. I shake hands with you all as friends and brothers. I feel deeply grateful to you for your expression of kindness made to me this day, and for the hospitality you have shown my party. My four men who first met you were safe, though so few among so many of you. They enjoyed your best accommodations, and a lodge was built for them to sleep in.

"I will write to the Great Father at Washington of all we do to-day. I will tell him of your kindness and good will toward his people; of your dependence on the buffalo for food and clothing. I will tell him that when you are deprived of these by the advance of the whites he

should relieve your poverty. He will, I know, give you protection; he is warmly interested in you and, I am confident, will soon send you proofs of his kind consideration."

I explained that the road to be made from the Mississippi to the Pacific would not injure the Indians nor deprive them of comforts; that whites would settle along the line, and though they would drive off the buffalo, they would also supply other articles in place of them. They would receive from the President implements of agriculture and learn to till the soil, so as to obtain food with less labor than now.

I told them that I would go through the lands of the Blackfeet and other Indians beyond the Yellowstone, carrying the friendly messages of the Great Father, and insisting on peace among all, to secure the safety of the whites. I promised to write to their good friend Governor Gorman, the Indian superintendent; told them that I knew him well, that he was a good and just man, and certainly their friend.

My remarks seemed to make a very favorable impression, and were received with every mark of respect. Their approbation was shown as each paragraph was interpreted by the ejaculation "How!" a common word, answering every purpose of salutation, approval, or concurrence.

After a short conversation among themselves, the Old Brave came forward, and shaking hands all round, addressed me as follows:

"My father, I have heard of our Good Father to-day with much joy. I trust this will be the day of hope for the Indians, for my children and for my grandchildren. The Father of Life made us all wish to live. I wish to live yet a good while. I wish to live for my children. You see around you our young men, our children, and our families. They are almost naked and destitute; you see them clad from the animals of these plains.

"My father, we have always been friendly to the whites since they first came into our country; we have observed our obligations with them; we have always treated them with kindness and hospitality, and we will continue to do so.

"My father, not long ago the Indians of the Missouri were called to a council at Fort Laramie; a treaty was there made, fixing the hunting grounds of each tribe. We have sacredly kept this treaty, and have never gone out of our alloted lands. But the Sioux, on one side, have come into our hunting grounds. The half-breeds, on the other side, have hunted on our plains; we have submitted patiently, knowing, my father, that the Great Father, when he heard of these things, would do us justice. We ask you to relieve us from these troubles.

"Our good father has told us about this road. I do not see how it will benefit us, and I fear my people will be driven from these plains before the white men. My father, our hearts are good; we are poor and have not much, but as a token of our kind feelings, accept those skins and robes on which you are seated."

I made no formal reply to this, but in a conversational way reiterated some of my former remarks. I added my warmest thanks for their present, and told them that we had some presents for them, excusing the small amount we could give them by the plea of the great distance we had brought them. I promised them more in future through the Indian agents, and inviting them to come to our camp and receive the gifts, I concluded the conference about 7 a. m.

The present they gave me consisted of thirty-two dressed skins and two robes.

We spent about half an hour in going around among the various lodges, and then returned

to our camp, being followed by the whole encampment. During the time we were engaged in inspecting their camp they became aware of the profession of Dr. Suckley, and there was scarcely a lodge that did not contain some patient for his medical attention. Ailments which had taken place years before were complained of, though some real sickness was prescribed for. The doctor vaccinated some eight or nine, and, through Le Frambois, explained to them its object, and showed them how they should do in nine days. It was near dusk when the party arrived at our camp and were arranged to receive their presents. (See sketch.) They were seated around in the form of three sides of a square, the open side being opposite to the places occupied by our party, the chief, and higher order of the Indians. At each of the four corners was posted a brave or chief. These men never receive a gift, considering it a degradation to accept anything but what their own prowess or superior qualities of manhood acquire for them. Their hearts are so good and strong that they scorn to take anything, and self denial and the power to resist temptation to luxury or easily acquired property is a boast with them. On these men, in time of peace, when difficulties occur among themselves, the tribe relies, and in time of war they are their leaders to the scene of action. To two old men of the tribe was assigned the duty of making the distribution, and the presents were placed in the centre of the area. During the whole distribution the Indians sat in perfect silence. All seemed satisfied with the articles they received, and not a grumble escaped one of them in regard to the assignment made. After this was over they returned to their camp, the chiefs and braves remaining. At about half-past eight we had a collation of coffee and bread in our mess tent, and remained till a late hour smoking and conversing. Soon after this our friends left, myself and the interpreters escorting them outside of our sentinels. I was much pleased with these Indians, and they seem to be very favorably inclined towards the whites, and sincere in their professions of friendship. Nothing to-day of the slightest value has been missed, as I can learn. Their hospitality I shall long remember, and the peculiar mode of manifesting kindness this night displayed will dwell long in my memory as one of the characteristics of the Assiniboine Indians.

The word Assiniboine has its origin as follows: They are an offspring of the Sioux. In the war of 1812 a number of these Sioux fought against a number of Chippewas, and took a good many of the latter prisoners. They tied these prisoners to a stake upon a large rock and burned them to death. Since that time they have been called Assini Boines, which, in the Chippewa language, means burnt rock.

ASSINIBOINE CAMP TO FORT UNION.

July 28.—It was very late this morning before we started, being occupied in fitting out a party consisting of Mr. Lander, Dr. Suckley, Mr. Burr, and Corporal Rummell, with instructions to strike the Pierced Rock, on the Mouse river, and make a careful examination for coal and iron. They were to explore the White Earth river, and make a thorough reconnoissance of the country; examine the Côteau du Missouri, and, reaching the 49th parallel, make a detour to the northwest, and arrive at the Yellowstone in some three or four days. Mr. Burr, at his own request, was placed in charge of the barometrical observations, and I instructed him to make numerous observations of elevations, depressions, valleys, &c., to secure the best profile

DISTRIBUTION OF GOODS TO THE ASSINIBOINES

possible. Dr. Suckley, at his own request, accompanied Mr. Lander for the purpose of making geological examinations and such collections in natural history as the route would afford.

Paul Boulieau and Le Frambois were left at the Assiniboine camp. They were to remain there two days to collect statistical information of the traditions, habits, &c., of these Indians, and prepare a vocabulary of their language; the former, in charge of a barometer, was to bring a profile of the line he pursued to the Yellowstone.

July 29.—The road to-day for about 20 miles was over a fine country, nearly level, with a marsh on the left, and beyond it two bluffs about 150 feet high. The last three miles was over a hilly, broken country, and we encamped on the bank of a small branch of Muddy river, near its source. Tinkham, Lambert, and Adams were sent out to sketch in the neighboring country; the former to go to the head of White Earth river and connect our route with Lander's. The two latter returned and reported the country good for grazing, with abundant water in ponds and streams—one pond being eight miles in circumference. The condition of our animals, as reported by Mr. Kendall, is so far excellent, and we have certainly achieved a triumph in making our first 700 miles with so little injury to them.

July 30.—Mr. Tinkham returned this morning from an examination of White Earth river; no special matter of interest observed, except that the country was of the same general character as that passed over by the main train. The country throughout to-day has been rolling and hilly, with stony knolls. At 18 miles from camp we crossed a small tributary of Muddy creek, 15 feet wide and 2 deep. Scattered trees are to be found in the coulées near this stream. Several dry water courses were passed in the course of the day, which probably, in the times of freshets, are occupied by brooks connecting with Muddy creek. Camp, water, and grass good, but no wood. Distance made to-day 23½ miles.

July 31.—Before light an Indian arrived in our camp, bringing the intelligence that Mr. Culbertson was some distance to the south of us, somewhere on Muddy river, with a wagon and four men, sent out by Mr. Osgood to meet us. Our guide assuring us that he thought we could not be over sixteen miles from Fort Union, I sent Mr. Tinkham out to say to him we would go into Fort Union to-night, and they need not go out of their way to meet us, as we would see them there.

Started at 8 o'clock. Our noon halt was made on Painted Wood creek, 10½ miles from our camp. Here we were joined by two Indians of another Assiniboine camp on their way from the north to Fort Union to get tobacco, &c.

About 16 miles of to-day's march was over a most excellent, hard, prairie road, of gradual but steady ascent, when it began to assume the appearance of a rolling country, much broken up, in advance of us.

When our odometer indicated we had made 20½ miles' march, being at a good camping place, although our two guides recognized two hills which marked the position of the Yellowstone, and thought them only about six miles off, we went into camp. We were soon joined by Tinkham, who had found the trail, but could find nothing of Mr. Culbertson's party. Kendall went out two or three miles to the eastward, and came back with the intelligence that he had crossed the trail, and seen indications that the wagon had gone and returned over the same trail. There is here a great scarceness of buffalo chips, which were destroyed by fire last spring. I ordered the breaking of two or three boxes and the issue of pemmican, and sent off

Le Bombard to the fort for flour, sugar, and a slight indulgence for all hands. The evening was spent in studying maps, dictating for the journal, reviewing the ground passed over, and in regard to future plans. Le Bombard had not returned, and no persons came out from the fort. This indicates pretty clearly, that our guide's estimate of distance was again out of the way.

August 1.—We were aroused by the arrival of Le Bombard and two voyageurs about 4 o'clock, they having spent all night on the prairie. Donelson came out to meet us; Grover also; and reported it at least ten miles to Fort Union. They brought us news from Fort Union of the death of sapper White, by the accidental discharge of his gun in his own hands. Made an easy march for about twelve miles over rolling prairie. Boutineau came out to meet us; afterwards Osgood and Graham.

Two miles out, at junction of beaten road, the line was formed, I taking my horse for the first time since our anticipated meeting with the Sioux. About half a mile further we came in sight of Missouri river, and the whole party gave three cheers as its beautiful bluff banks, dotted with timber, came in view. As we rounded the hill cutting off view of Fort Union, Grover came up, and was received with three cheers. On the coming out of Lieutenant Donelson and Mr. Denig, in charge of the post, I ordered a volley of the small arms of our command, to express admiration of his first arrival. This was answered by a salute of 13 guns.

We pitched camp 16½ miles from the camp of last night, and soon after there was an assembling of the whole party at my tent. I congratulated them on the zealous performance of their duty, gave them a cordial invitation to go on, and whatever their determination, even should they leave us here, promised them an honorable discharge. All seemed desirous of going on, and not one availed himself of the opportunity to leave the expedition.

By the great vigilance exercised on the march the animals had been constantly improving, gaining flesh and becoming cured of sores; so that, though we started from the Mississippi with forty disabled animals, all but one were serviceable on our arrival at Fort Union.

LIEUTENANT GROVER'S TRIP FROM PIKE LAKE.

Lieutenant Grover, on leaving us at Pike lake on the 25th June to pursue a more southerly route to Fort Union, crossed the two forks of the Chippewa river, and fifteen miles south of the route of the main train, where he found them each of about the same size, viz: thirty yards wide and six feet deep, with unwooded shores, sandy bottom, and a velocity of about four miles an hour. After passing the second (Pomme de Terre river) no stream is met with as far as Lake Traverse, 47 miles in a direct line.

The prairie gradually changes its character and becomes by degrees less rolling, until after going fourteen miles and passing the Moose Island lakes it becomes almost a dead level, quite soft, and in some places marshy, without a tree or twig in sight the whole distance of 33 miles to the foot of Lake Traverse. Towards the north this flat region is bounded only by the horizon, but to the south, at a few miles distance, it gradually rises, becoming rolling, and is again filled with small lakes, which sometimes discharge their waters into streams running to the southwest.

Lake Traverse is a beautiful sheet of water, twelve miles long and from two to three wide, studded with a few small islands; its water level sixty or seventy feet below the general level of its banks; these are quite abrupt and cut by deep ravines branching in every direction,

and drawing the surface water of the vicinity into the lake. Wood is scarce at the lake, probably from its destruction by the Indians and by prairie fires.

Rabbit river discharges into it about three miles from its foot, being there ten yards wide, with a rapid current and rocky bottom.

The Bois de Sioux, which forms its outlet, runs a few degrees east of north, and with a slow current, not exceeding a mile an hour, forms one of the principal branches of Red river. Lieutenant Grover followed it down for twenty-two miles, and found it to vary in width from forty to over a hundred yards. Its bottom is sandy, and depth not more than four feet. In ordinary stages its water is nearly flush with its banks, but in floods it overflows the bottom for a mile in breadth.

He crossed it only three miles higher up than the crossing of the main train, and again diverging from our route in a direction a little north of west, crossed a scarcely perceptible divide, and struck the Wild Rice river where it makes a wide bend near a tract of sand hills called Lightning Neck, which spring up abruptly from the level plain, and cover several miles of area. He crossed the Wild Rice thirty-five miles from the Bois de Sioux, where it is only fifteen yards wide and four feet deep. Thence to Jacques, or James river, fifty miles in a direct line, extends a gently rolling prairie, with some high sandy divides and rocky ridges near its centre, among which the most prominent is Dead Colt Hillock.

James river, which flows into the Missouri, is near the mouth of Grizzly Bear creek, a clear, sluggish stream, averaging forty-five yards in width, five feet deep, and with a hard clay bottom. It takes a sinuous course through a rich valley from one to three miles wide, and in parts subject to overflow. The Grand Côteau, or dividing ridge between James river and the Missouri, may be regarded as divided into two terraces; the first, with a general level about ninety feet above James river, having a very gently rolling surface, so that the second terrace may be seen above it at a distance of thirty or forty miles. There are but few streams, some of them becoming dry and nearly all the water being collected into little ponds, many of which are never dry. The soil of this lower terrace is harder and drier than the prairies previously passed over, and contains more gravel. This terrace is fifteen or twenty miles wide, and is then succeeded by the second, a broad expanse of broken country, irregular in outlines. Sections of it are merely high and rolling, with sometimes an extended level plateau; other parts rising in abrupt peaks of no great height, or again in long bare ridges. Small lakes are numerous, some of them salt.

Skirting this high terrace for fifty-two miles he reached the head waters of Shyenne river, and soon after Mouse river, 180 miles northwest of where he crossed the James, and at our camp of July 20, whence to Fort Union his course coincided very nearly with ours.

LIEUTENANT DONELSON'S TRIP UP THE MISSOURI.

Lieutenant Donelson's party for the survey of the Missouri consisted of Lieutenant John Mullan of the army, Mr. W. M. Graham, astronomer, one sergeant, two artificers, and three privates of the corps of sappers and miners. Lieutenant Mullan was placed in charge of the meteorological observations, and also assisted in making the topography, Serjeant Collins aiding him in this branch. The steamboat Robert Campbell, in which he engaged passage, was

propelled by a double engine, and had been a first class Missouri river packet. She was about 300 tons burden, had on board the maximum load, and drew about five feet of water.

The plan of making the survey was as follows: Meteorological observations were taken usually at every halt, and astronomical whenever practicable. A topographical sketch was made from a point about twenty miles above St. Joseph, Missouri, upwards, for which purpose he, with Lieutenant Mullan and Serjeant Collins, alternately performed the work of running courses, estimating distances, and mapping.

Hourly soundings were taken from near the mouth of the Big Sioux to Fort Union. Notes were made of all the features of the river and adjacent country, as observed from the steamboat, and all information practicable was obtained from gentlemen of the Fur Company, traders, and voyageurs.

The boat travelled by night as far as St. Joseph's, and omissions in that part of the survey were thus rendered necessary, which, in the maps, are supplied from the surveys of Nicollet, Lewis and Clark, and others.

Owing to the loss of part of his notes, on the way from Olympia to Washington, he was unable to give the soundings made above the mouth of the Big Sioux.

The following is the substance of Lieutenant Donelson's description of the Missouri from St. Louis to Fort Union:

Below the mouth of the Kansas its banks are almost continuously settled, while all the more prominent localities are occupied by flourishing cities, towns, and villages. The soil is of surpassing fertility, and the adjacent country rich in coal, iron, and other minerals. Cottonwood is the prevailing growth in the bottoms, while willow is very abundant at the water's edge, and sycamore in the higher bottom lands; but there is also found abundance of oak, walnut, ash, maple, elm, and many other trees, principally on the slopes of the immediate valley of the Missouri. The average velocity of this portion of the Missouri is a little over five miles an hour. From the continually recurring changes to which the Missouri is liable, at nearly every bend there is a sand bar or island, and a series of snags and sawyers. These also generally occur wherever, from any cause, the water is still or there is a counter current, and where there are eddies or whirlpools. The difficulty in navigation is to discover in season an unobstructed channel. Concealed snags and sawyers are liable to occur in any part of the river.

The two ranges of hills which limit the valley are from seven to fifteen miles from each other, the river flowing alternately from one to the other in its winding course. Prairie occurs on the banks at only one or two places, the rest being heavily wooded. In many instances the bottoms may be said to be swamp land, being occupied by numerous marshes, lakes, ponds, and sloughs.

The permanent obstructions in the river below the mouth of the Kansas are a chain of rocks, about twelve miles below St. Charles, and one a little below Sibley. He could obtain no facts as to the effect these now have upon navigation; but they are doubtless of little importance. The river is open all the year as high as Boonville; above this, to Council Bluff City, it is closed with ice for about a month in winter.

From the Kansas up to the mouth of the Platte, the two ranges of hills which limit the valley continue to be from seven to fifteen miles from each other, and are from seventy-five to two hundred and fifty feet in height.

The timber on the banks diminishes in quantity from Fort Leavenworth to near the Platte, while the hills are thinly wooded with oak, elm, and ash, and the river banks skirted by a belt of cotton-wood and willow, varying in width from a few hundred yards to two miles; the space between this belt and the foot of the hills consists of prairies that are level and bare of timber. Ponds, sloughs, and marshes continue, but to a less extent.

Above St. Joseph the steamboat ceased to travel at night on account of the increased difficulties of navigation; but this necessity will be obviated when the dangerous obstructions are removed, and a more thorough knowledge of the river gained.

Opposite St. Joseph the growth was observed to consist of cottonwood, elm, ash, box-elder, maple, basswood, mulberry, dogwood, and oak. By rough measurement, the width of the river just above St. Joseph was four hundred and sixty yards, and the velocity of the current three miles per hour; the main channel was near the left bank, and there the velocity was much greater. The tortuous course of the river here is shown by the fact that the distance from Weston to St. Joseph by land is twenty-eight miles, by water sixty. Above this it is straight, and widens to from seven hundred to one thousand yards.

From the Platte to Fort Pierre, the distance on the river is, according to Nicollet's maps, 638 miles. The banks of the river might be almost continuously settled as far up as the north of L'Eau qui Court; above this point some twenty-five per cent. of them are available; and in the whole distance the valley gradually becomes less fertile. The river varies in width from four hundred to a thousand yards, and the shoals and rapids (of which there are eight between the Platte and Sergeant's Hill) make that portion of the river up to the mouth of the Big Sioux the most dangerous for navigation. Above the mouth of the Sioux the current became much more rapid, and the crew were compelled to cordelle the steamboat for about half a mile.

From Fort Pierre to the White Earth river obstructions are comparatively few, and navigation safe. Above the White Earth the river has an exceedingly tortuous course, and is impeded by an unusual number of snags and bars. The boat was partially unloaded at the fort, and now only drew $3\frac{1}{2}$ feet of water, by which the ease and speed of travel were increased.

At Fort Pierre the bluffs are about four miles from each other, and equally distant from the river. There are many points suitable for settlements, having a tolerably rich soil and producing fine grass. The banks are in many places well timbered with cottonwood interspersed with ash; cedars occur in small numbers in the ravines. This tree, first seen near the L'Eau qui Court, becomes very important on the Upper Missouri, as it grows where other kinds will not, and furnishes the best of fuel, as well as very durable timber. Several islands are covered with it, and named from that circumstance. Timber of all kinds is quite insufficient for the supply of steamboats, and on several days it was necessary to use the remains of abandoned trading posts.

The width of the river varies from one hundred and fifty to three hundred yards; at Fort Union it has been found to be three hundred paces wide, measured on the ice in winter. Great bends occur near Forts Pierre and Berthold; the first eight miles across and twenty-five around, the second twelve across and forty around.

At Fort Clark the Indians cultivate, with tolerable success, corn and some vegetables. At Fort Berthold and above. the bluffs rise to a height of from one hundred and fifty to three hundred feet, and are bare of vegetation; and from the variety of colors imparted to them by

the red clay, lignite, and a white substance they contain, present a picturesque appearance. They sometimes have quaint forms, reminding one of old towns and castles seen at a distance. They are often called by the traders Mauvaisses Terres, on account of containing quagmires filled with clay, covered with a white incrustation, which gives the surface a firm appearance.

Lieutenant Donelson went up in the Robert Campbell to a point about seven miles above the mouth of the Poplar, where difficulties from sand bars were encountered, which he thought could have been overcome, but the managers of the boat thought it best to return from that point, and therefore carried ashore the freight for Fort Benton, which was to be conveyed there by cordelling a large keel boat. In descending to Fort Union again, the boat travelled with nearly three times the speed made in ascending, and no material obstructions were met with.

Wood was more abundant than below Fort Benton, chiefly cottonwood and willow.

The Robert Campbell was forty-two days ascending to Fort Union, and about seventeen in returning to St. Louis. The round trip, however, has been made in forty-four days, and, with suitable boats, could be made in even less time. The same steamboat can easily perform in one season four round trips from St. Louis to Fort Union.

LIEUTENANT DONELSON'S EXPLORATION OF THE COUNTRY ABOUT FORT UNION.

Lieutenant Donelson and his party, before our arrival at Fort Union, had made an exploration of the country north of Fort Union, between Big Muddy and White Earth rivers. Leaving artificer White at the fort to make meteorological observations and take care of the property, the remainder, twelve in number, left on the 12th of July, and travelled north-northwest up the valley of the Little Muddy for a distance of 42 miles, in a direct line from the fort; then, with a general direction easterly, crossing the heads of the Big Muddy to the head of the White Earth, 75 miles east of the Little Muddy; and following it down for thirty miles, left it and crossed the country westward, on a line nearly parallel to the Missouri, to Fort Union, 62 miles to the west. The distance travelled, as estimated, including the sinuosities of the route, was two hundred and thirty-five miles, or twenty-six miles more than as above stated. He thus explored a tract from twelve to twenty-five miles wide on each side of our route, which passed nearly halfway between his two lines of survey in going out and returning.

He gives the following account of the country: It may be characterized as a vast plain, destitute of timber, covered with boulders and pebbles of granite, limestone, &c., broken towards the north by innumerable hillocks, between which are ponds, and towards the south, intersected by the branches of the Missouri. At the heads of the Big Muddy and White Earth is the most elevated part of the ridge or terrace, called the Grand Côteau, appearing at a distance of six miles like a distant shore, about a hundred feet high, but the ascent was so gradual as to be imperceptible. A considerable depression in the country occurs in the valley of the Little Muddy, by which this Grand Côteau can be passed around.

All the streams are small, and can be of no value for navigation; they are also liable to very high freshets. A chain of sand hills occurs about thirty-two miles northwest of Fort Union, covered with a thick growth of small willow. Near the head of Miry river is an outcrop of lignite, like that in the Missouri.

I may here make a general review of the country on the route travelled by us since reaching the Bois de Sioux.

GENERAL REVIEW OF COUNTRY.

The whole distance from St. Paul to Fort Union by our route is, by odometer measurement, $715\frac{1}{2}$ miles, and we had accomplished it since June 8, the day the baggage train left Camp Pierce, or in 55 days, and, excluding halts from time to time, (7 days,) in 48 travelling days. The rate of travelling was therefore about 15 miles a day, most of the way over a country almost unknown, without roads, and with such an imperfect knowledge of the distances to be made between camps as to cramp our movements much more than if the route had been measured and itineraries constructed for our use.

The Bois de Sioux, at the point of crossing, twenty-five miles below its source in Lake Traverse, is 70 feet wide and from four to seven feet deep; the soil is rich on its banks, and beyond it for eleven miles, to Wild Rice river, extends a smooth, flat prairie. This last stream is 40 feet wide, skirted with elms. Thence a smooth prairie extends to Shyenne river; sand knolls, ponds, and marshes become frequent as the river is approached, but do not injure the nature of the road. The Shyenne is 60 feet wide and 14 deep, being the largest branch of Red river crossed by the train, and resembles the preceding stream, except in the smaller amount of timber and the greater depression of its valley below the general surface.

Forty-five miles south of this place, and near the head of Lake Traverse, commences the elevated ridge called the Côteau des Prairie, which forms the first of the high barren ridges separating the branches of the Missouri south of the proposed route, and rising 2,046 feet above the sea level.

The route across the bend of the Shyenne leads over higher and drier prairies, with still less wood and water, for 85 miles; not a tree in sight for intervals of 20 miles, and the surface becoming more broken with deep coulées and ravines towards the second crossing of the river, which is here only 50 feet wide and three or four deep, flowing some 150 or 200 feet below the general level, and with steep bluffs on the sides. The valley is half a mile wide and the shores wooded. Salt grass and deposits of salt present themselves on the way, and numerous small marshes and ponds intersect the road, but form no serious obstacle.

Near the Shyenne considerable limestone occurs, and in many places the ground in the vicinity as well as incrustation on the stone indicate the presence of iron, probably decomposed pyrites. All difficulties in this part are avoided by the line passing south of the Shyenne, as already mentioned, where traversed by Lieutenant Grover.

The country now assumes a bolder character; the swelling surface takes the form of terraces and ridges; ponds and marshes occur more frequently; timber disappears from the uplands; the prairie becomes gravelly and abounds in granite boulders; and the river itself, moderately fringed with wood of different kinds, flows through a deep intervale, enclosed by sand and clay bluffs from 150 to 200 feet high, which are again surmounted by occasional hills sufficiently conspicuous to serve as landmarks to the hunters, and associated with thrilling reminiscences of Indian story.

This forms the lower terrace of the dividing côteau, as described by Lieutenant Grover.

After leaving the Shyenne at its second crossing, the country becomes still more elevated and undulating, with less water, and for ninety miles not a stick of wood. The general elevation of the surface does not rise much above fifteen hundred feet, and forms a terrace from

which rise the waters of Red river and Jacques or James river, a branch of the Missouri. Southwest of this the second terrace or côteau bordering the valley of the Missouri rises much higher, broken and irregular in outline and again full of small stagnant ponds, many of which are salt.

The route selected here approaches that of the main train, crossing James river fifty miles further down, where there is a little wood on its banks. But from here to Mouse river Lieutenant Grover found, for one hundred and eighty miles, not a particle of any kind.

Lake Jessie and others along this route are salt, some only slightly brackish, and the theory for their saline qualities is found in the fact that they never are washed out, and retain the salt deposits and incrustations. Sometimes two lakes, hardly twenty yards apart, differ entirely, one being so saline that the water is offensive, the other excellent, having a free and constant outlet.

The Butte de Morale is a prominent landmark, rising two hundred and eighty-two feet above the Shyenne river, near its source. Not far west of this the camp of July eighteenth was beautifully located on a range of hills nearly surrounded by salt lakes, though an excellent spring near by furnished an abundant supply of cold fresh water. Here wood was found for the first time after leaving Lake Jessie, ninety miles back. Near Mouse river salt marshes were passed, and in some places deposits of salt a quarter of an inch thick were observed.

The configuration of Mouse River valley, as well as of its tributaries, resembles that of the Shyenne.—(See sketch.) High ridges divide the plateau bordering the stream from that extending into the prairie, with coulées intersecting it and opening into the river on the one side, gradually growing imperceptible as they make into the prairie on the other. The general course of the river, and of its principal branch, the Riviere des Lacs, is nearly parallel to that of the Missouri, for the distance we followed it, of eighty-seven and a half miles to its source, and separated from that river by the Plateau du Missouri, varying from thirty-five to fifty-five miles in width. Many of the coulées reach to the edge of the Missouri plateau; and in the examination for a good passage for the wagon train, secluded spots were found where beetling crag and winding stream, venerable trees and greenest sward combined in scenes of much picturesque beauty.

Its valley is from half a mile to a mile wide, about two hundred feet below the prairie level, and is well wooded with maple, oak, ash, and elm. The deep coulées run back from it for fifteen or twenty miles, and must be avoided by keeping far from the river itself. They usually contain a stream of good water, and sufficient timber on the banks for camping purposes. One of the bluffs of the côteau, twenty miles from Mouse river, was found by Mr. Moffett to be seven hundred and two feet above its level, and a hill seven miles from camp rose to two hundred and fifty-six feet.

The distance from Mouse river to Fort Union, as travelled, was 118¼ miles. The route crosses the Grand Côteau, a collection of high, strong, and barren knolls, with great numbers of small ponds lodged between the hills. Scarcely any wood is to be found, except a little on White Earth river and its branches; but as water and grass are usually plentiful, this ridge will become a good grazing country. The general elevation is between 2,000 and 2,500 feet, and it descends again at the Missouri (Fort Union) to 2,019 feet.

In ascending along the Riviere des Lacs the côteau appears to decrease in elevation until

Stanley Del.

Sarony, Major & Knapp Lith. 449 Broadway N.Y.

NEAR MOUSE RIVER

Stanley Del.

Sarony, Major & Knapp, Lithrs 449 Broadway, N.Y.

FORT UNION, AND DISTRIBUTION OF GOODS TO THE ASSINNIBOINES.

blended insensibly with the rolling prairies rising from that river. On the approach to these high prairies from the valley the swelling outline assumes the appearance of a distant coast, which seems to rise in a direction parallel to the route of the traveller, and suggests the idea of a plateau or bench of table land beyond; hence the use of the word côteau. But this appearance has proved so frequently deceptive that only a thorough exploration can be relied upon.

North of the plateau an admirable reconnoissance by Mr. Lander develops a low, marshy prairie, extending, with little variation of surface, to the head of Mouse river, beyond the forty-ninth parallel; returning from which river to Fort Union the plateau is found declining to a wide valley or coulée, connecting almost directly with the Missouri, in a southwest direction, offering a good chance to turn the côteau, in an engineering view, and becoming thus another important key-point on the railroad route.

The plateau between the Missouri and Mouse rivers cannot be called simply a rolling prairie, though in detail resembling the hilly prairies noticed, although in a very exaggerated degree, having a general similarity of outlines, an absence of wood and rocks in place, boulders plentiful, ponds and marshes, if possible, more frequent; but the elevations are so much greater as to form considerable hills and ridges several hundred feet high, which become still more rugged on the approach to Fort Union, where they end abruptly on the level intervale of the Missouri. It is intersected by numerous water-courses, which are dry in summer, showing the same character of sandy and clayey soil in the bottoms, which is also seen in the rain-worn sections of the most elevated points. Vegetation is generally scanty on this plateau; grass is rank in the bottoms, but mostly thin and inferior for grazing; the prickly pear begins to appear, and a kind of wild turnip is found in comparative abundance, being the only useful production yet known, and the food of the wandering Indians, by whom it is regularly gathered.

On his arrival at Fort Union Mr. Culberston despatched an express to Fort Benton with presents and tobacco to the chiefs of the Blackfeet nation, and the following message from me:

"I desire to meet you on the way and to assure you of the fatherly care and beneficence of the government. I wish to meet the Blackfeet in a general council at Fort Benton. Do not make war upon your neighbors. Remain at peace, and the Great Father will see that you do not lose by it."

Mr. Culberston had informed me at St. Louis that for one entire year he was enabled to restrain the Blackfeet from making war upon their neighbors, and he believed that he could have done so still longer had they shared in the liberality of the government. But his efforts proved unavailing; for they said, in answer to his appeal, "Why should we cease to make war? It is the only chance we have of receiving a portion of the goods and presents distributed among the Indians."

FORT UNION.

Fort Union (see sketch) is situated on the eastern bank of the Missouri river, about 2¾ miles above the mouth of the Yellowstone. It was built by the American Fur Company in 1830, and has from that time been the principal supply store or depot of that company. It is framed of pickets of hewn timber, about 16 feet high, and has two bastions, one at the northwest and one at the southeast corner. The front or main entrance is on the side opposite the river. This

fort is probably 250 feet square. The main buildings, comprising the residence of the superintendent and the store, are on the front or eastern side. They are two stories high, and built of wood. The shops and dwellings of the blacksmith, the gunsmith, the carpenter, the shoemaker, the tailor, and others, are of adobe or of wood, and occupy the other sides. These mechanics are mostly French half-breeds, and have half-breed or Indian wives, and many children. There is a grassy plain around and near the fort, extending to the base of the rising ground, which is a full mile distant on the eastern side. The Assiniboines, the Gros Ventres, the Crows, and other migratory bands of Indians, trade at this fort, exchanging the skins of the buffalo, deer, and other animals, for such commodities as they require. Mr. Culberston, who has occupied the position of chief agent of the company during the past twenty years, has under his supervision not only Fort Union, but Forts Pierre and Benton also. He is a man of great energy, intelligence, and fidelity, and possesses the entire confidence of the Indians. His wife, a full-blood Indian of the Blood band of the Blackfoot tribe, is also deservedly held in high estimation. Though she appears to have made little or no progress in our language, she has acquired the manners and adapted herself to the usages of the white race with singular facility. Their children have been sent to the States to be educated in our best schools.

From the second to the ninth day of Angust we were closely occupied in preparing for the continuation of the survey westward of the mountains. The men were occupied in making Pembina carts, and additional transportation was purchased of the Fur Companies. Our experience thus far had shown how well adapted ox-trains were to transportation, and accordingly two additional teams were added at Fort Union. In all these arrangements both the Fur Companies zealously co-operated, placing at my disposal not only all the animals they could spare, but guides, hunters, and their information in regard to the country. We were much pleased and much benefited by the good offices of the Indian women at the two posts, the wives of the factors and officers of the companies, who fitted us out with a good assortment of moccasins, gloves, and other guards against the severity of the weather in the fall and winter. On the 5th of August Mr. Lander reached Fort Union, from his reconnoissance of the River of the Lakes, Côteau du Missouri, and the upper waters of Mouse river. This reconnoissance was a very extended one, and enabled me to report as to the source of the River of the Lakes, the character of the côteau in the vicinity of the 49th parallel, and the most favorable lines for crossing it and descending to the valley of the Missouri. He found lignite on the River of the Lakes, and in his trip was brought in contact with several bands of Indians, who, although somewhat uncertain and even hostile at first, became entirely satisfied with the operations of his party, and offered no obstruction to his progress.

I have referred to the fact that on my arrival at Fort Union not a man desired his discharge, although every man was offered an honorable discharge who desired to be relieved from duty at that point. The men, however, became in a few days exceedingly alarmed as to the difficulties to be expected from snow in the westward journey. The voyageurs belonging to the Fur Companies' posts thought it a good practical joke to spread bugbear stories about the immense snows to be expected early in the season, and many of the men got to believe that they would find snow knee-deep before they reached Fort Benton, and that it would be twenty feet deep in the passes of the Rocky mountains in October. Fortunately I had with me some books of travel in that country, particularly De Smet's Oregon Missions, and had carefully, to the best of my ability, investigated the climates of the country west of the Rocky mountains. Mr. Culbertson and the officers of the companies also gave me reliable information in reference to

the lightness and the lateness of the snow this side of the mountains, and therefore little difficulty was found in satisfying the men that they had been trifled with in this matter. There were also some little differences of rank between two of the military gentlemen, growing out of a mistake of my own, soon after leaving the Mississippi, which were adjusted on terms most honorable to both, and in the most satisfactory manner to myself.

On the 7th of August there was a distribution of presents to the Assiniboines, at which I was present. I now took a deep interest in the welfare of these Indians, from their kind treatment of my party at their camp before crossing the Côteau du Missouri; and I took this occasion to give my mite in the way of cultivating friendly feelings on their part towards their own agents and the government of the United States.

The same day the steamer St. Ange arrived from St. Louis, bringing some supplies from the quartermaster's department, and giving a most favorable opportunity for the return of such of the hunters and guides whose engagements expired on their arrival at Fort Union. .I determined to send the quartermaster and commissary clerk, Mr. Everett, to Washington, by this steamer, to report in person as to the progress of the expedition. I did not think he was strong enough to encounter the fatigues and hardships of the remainder of the journey, and his return was deemed a matter of necessity.

Mr. Stanley, the artist, was busily occupied during our stay at Fort Union with his daguerreotype apparatus, and the Indians were greatly pleased with their daguerreotypes. The scientific parties were also diligent in making their observations. As I have before observed in a former part of this narrative, I had suffered greatly from debility on the route, and I determined to make my arrangements so that I should be relieved from much of detail duties. I was anxious to cover as much of the country as possible, and determined to organize two parties to explore the country—one party, under Lieutenant Donelson, to pursue the general course between the Missouri and Saskatchawan towards the Cypress mountains; and the other, under Lieutenant Grover, to continue on the usual travelled wagon road, *via* Milk river, to Fort Benton. The supposed point of separation of the two parties was the Big Muddy river, and it was determined that the final arrangements should be made at that point. Accordingly, on the 9th of August, both Lieutenant Donelson and Lieutenant Grover's parties started, and I remained behind until the following day to settle my accounts and to complete my arrangements generally with the companies. Dr. Evans had not yet arrived from his examination of the Mauvaises Terres, and a letter was left for him, expressing my strong desire to meet him at Fort Benton. An expressman, whom I had despatched to Fort Benton on the 6th of August, with a letter of instruction to Lieutenant Saxton, was, unfortunately, obliged to return, in consequence of the loss of his horse and some difficulties he experienced with the Indians, and I concluded not to despatch him again until my arrival at the Big Muddy.

CHAPTER IV.

FORT UNION TO FORT BENTON.

GOVERNOR STEVENS LEAVES FORT UNION.—WAR PARTY OF BLACKFEET.—CAMP ON LITTLE MUDDY CREEK.—COUNCIL WITH BLACKFEET.—MRS. CULBERTSON.—ARRIVAL OF LIEUTENANT GROVER.—PROGRAMME CHANGED.—REORGANIZATION OF THE PARTY.—CONVERSATION WITH THE WHITE MAN'S HORSE.—EXPRESS SENT TO FORT BENTON.—DESCRIPTION OF COUNTRY BETWEEN FORT UNION AND BIG MUDDY RIVER.—REMARKABLE SANDSTONE FORMATION.—POPLAR RIVER.—METEOROLOGICAL OBSERVATIONS.—NUMEROUS VILLAGES OF PRAIRIE DOGS.—PORCUPINE AND MILK RIVERS.—VALLEY OF MILK RIVER.—CAMP ATCHISON.—ORDERS.—REFERENCE AND REPLY TO A LETTER FROM LIEUTENANT DONELSON, PUBLISHED ON THE LAST PAGE OF VOL. I.—ALARMING REPORT.—ENGINEERS ACTIVELY AT WORK.—SMALL PARTY SENT TO PANTHER HILL.—ABUNDANCE OF GAME.—WILD HORSES SEEN BY RECONNOITERING PARTIES.—EAGLE SHOT.—THE FIRST SAGE SEEN.—CROSSING OF MILK RIVER.—A DEPUTATION OF GROS VENTRES.—THE EAGLE CHIEF AND WHITE EAGLE.—LITTLE SOLDIER AND WHITE ANTELOPE.—GOVERNOR STEVENS'S HEALTH IMPROVES.—ORGANIZATION OF TWO PARTIES UNDER LIEUTENANT GROVER AND MR. LANDER.—WAR BETWEEN GROS VENTRES AND BLACKFEET.—ITS CAUSE.—A HEROINE.—HER ADVENTURE.—THE COMET.—CAMP OF THE GROS VENTRES.—THEIR HABITS.—POLYGAMY UNIVERSAL.—FEAST AND COUNCIL.—THEIR HATRED AGAINST THE BLACKFEET.—GOVERNOR STEVENS'S CONCILIATORY SPEECH.—THE MEETING BREAKS UP.—FURTHER CONSULTATION.—ACCEPT THE ADVICE OF GOVERNOR STEVENS.—VISIT THE CAMP.—FIRING OF THE HOWITZER.—PRESENTS.—THE COMET AND AURORA BOREALIS.—CAMP ARMSTRONG.—PROPOSITION OF LIEUTENANT GROVER.—PURCHASE AND EXCHANGE OF HORSES.—SUGGESTION OF LIEUTENANT DONELSON.—THE RUNNING FISHER.—LIEUTENANT GROVER'S FIELD OF DUTY.—MR. CULBERTSON GIVES INFORMATION CONCERNING THE GROS VENTRES.—HIS ADVENTURE.—THE PRAIRIE ON FIRE.—BRANCHES OF MILK RIVER ISSUING FROM THE CYPRESS MOUNTAIN.—BEAR'S PAW IN SIGHT.—THE THREE BUTTES OR SWEET GRASS HILLS.—SINGULAR FACT CONNECTED WITH THE STREAMS OF THIS REGION.—APPREHENSIONS FOR THE SAFETY OF MESSRS. LANDER, GROVER, AND STANLEY.—A SPRING.—AN AMUSING STORY RELATED BY THE RUNNING FISHER.—MARIAS RIVER.—CITADEL HILL IN SIGHT.—SPOT WHERE A BATTLE WAS FOUGHT BETWEEN GROS VENTRES AND CROWS.—VALLEY OF THE TETON.—ARRIVAL AT FORT BENTON.

I started on the 10th from Fort Union at about twelve o'clock, followed by a war party of the Blackfeet, consisting of twenty Blood Indians and forty Piegan Indians, who arrived at Fort Union on the 8th instant on a visit to my party, and with whom I had had the most friendly interchange of civilities. I desired their company for two or three days, in order to impress them fully with the beneficent policy of our government towards the Indians, and with the peaceable character of my own duties and objects, intending then to despatch them on their way to their several tribes and to make generally known to the Blackfeet nation our objects in passing through their country. I camped that evening with Lieutenant Grover on the Little Muddy river, when, towards night, a serious difficulty came near happening between them and our party. Mr. Culbertson and myself, however, succeeded in arranging the matter, and we spent a most interesting evening with the principal men in conversing about the Blackfeet and the Indian policy of our government. On this occasion I presented the subject of a general council, to be held at Fort Benton the ensuing year, to make peace between the Blackfeet Indians and the hunting tribes west of the mountains, and to preserve peace with the white children of the Great Father. On this, as on previous occasions, Mrs. Culbertson, a native of the Blood tribe of the Blackfeet, was unwearied and efficient in her good offices.

The next day, being the 11th of August, we reached the Big Muddy river. The crossing of the Big Muddy was a somewhat difficult ford, and we were all highly gratified with the zeal and efficiency of one of the Blackfeet, who pulled as steadily at the rope as any man of

Stanley Del. Sarony, Major & Knapp, Lith.rs 449 Broadway N.Y.

COUNCIL WITH WHITE MAN'S HORSE.

my party. Lieutenant Grover arrived the next day, and on this and the following day, after much reflection, I determined to change the programme decided upon at Fort Union. There were difficulties in the way of organizing properly two parties, providing each with the necessary number of hunters, guides, and spare horses, and I became satisfied that no good result would follow from sending a large party along the general line of the divide between the Missouri and the Saskatchawan. It was obvious to my mind that everything desired could be accomplished by occasionally sending small detached parties off the line, if we pursued the route of the Milk river with the whole party. Accordingly, the whole command was brought together at the Big Muddy, Lieutenant Donelson put in charge of the camp and line of march as executive officer, and the other gentlemen assigned to duty in their respective fields. I relied upon Mr. Lander and Mr. Tinkham to make examinations of the route, in connexion with the line of the main train, in order to exhaust our knowledge of the adjacent country in reference to the question of railroad practicability, and Mr. Grover could be placed in charge of detached parties. Before leaving the Big Muddy I had a long conversation, already alluded to, with the White Man's Horse, (see sketch,) the chief of the war party of Blackfeet. He had frequently visited the Bitter Root valley, and stolen horses from the Flatheads. He observed, "I take the first Flathead horse I come across; it is sure to be a good one." He and one of his men had just returned from the Flathead country, and they gave a very favorable description of the route, assuring me (pointing to my wagons and Pembina carts) that there would be no difficulty in taking them through the mountains. They left the Big Muddy with us, and moved ahead to carry the news of our coming to their brethren. I now sent forward my express to Fort Benton, with instructions to Lieutenant Saxton, and letters from Mr. Culbertson to the officers at the post at Fort Benton, to have animals and everything arranged against our arrival. The country between Fort Union and this point (the Big Muddy) is broken and rolling, with occasional formations of the mauvaise terre and outcroppings of sandstone. The country is well grassed for all purposes of voyaging, and there are many tracts and swales of land on and in the vicinity of the Little Muddy well adapted to cultivation. On the Big Muddy there is quite a large and open valley of a very good soil and excellent grass, with a heavy growth of cottonwood near its junction with the Missouri.

Whilst encamped at the Big Muddy Mr. Stanley examined some buttes opposite our camp, and made some sketches, one of which deserves more than a passing notice. On the top of a butte jutting out from the main plateau, he found what at first appeared to be a drift of saw logs, but which, upon examination, proved to be a sandstone formation, lying out full upon the surface, and resembling regular cuts of round timber. They were disposed in two parallel lines, running east and west. The most southerly contained thirteen lengths, besides several displaced pieces; the length being from one to six feet. Embedded in these stone logs were small particles of oxide of iron, the size of buckshot. On the butte he gathered several much larger specimens, many as large as canister shot.

Other buttes in this locality are composed of clay, surmounted by a stratum of sandstone, varying in thickness from one to six feet, in many places discolored by iron, and showing distinctive evidence of the action of fire.

Half a mile further north there was a similar formation, where the logs were much larger, being three feet in diameter, but were less regular in their disposition. The butte was washed

into gullies, by which many pieces were displaced, square blocks being piled into irregular heaps.

On starting from the Big Muddy on the 14th of August the command was in the most excellent condition and spirits. Two of the mule teams were strengthened by an additional pair of mules, and the wagons were somewhat overloaded, for I determined to take nearly all my provisions at the depot at Fort Union along, so that there should be no possibility of suffering for want of food, even though the depot of provisions in the Bitter Root valley had not been established by Lieutenant Saxton. We made 11½ miles, and encamped at a most beautiful point, in the midst of luxuriant grass. The day was very sultry, some rain fell, and one ox died from the heat.

August 15.—Excellent road all day. Crossed Poplar river, and encamped on the west side; excellent water and grass. Distance 18 miles. I now felt the importance of renovating my health, in order to prepare for the mountain work. It had been my custom thus far to continue at work until midnight, and to be up with the first in the morning. As Mr. Donelson had relieved me from many of the executive details, I now resolved to remain in camp and make a late start, the party moving off at an early hour.

August 16.—The road to-day was over the level river bottom of the Missouri. Timber in sight all day, the route running through timber for about one mile. Reached a camp where there was excellent water, grass, and abundance of timber, at about 5 o'clock, making 23⅔ miles. The animals came in in excellent order. I issued this evening an order directing every person in the expedition, so far as it was consistent with his duties, to walk a portion of the way each day; for, in approaching the mountains, my effort was that the animals should be increasing rather than diminishing in flesh, and our experience on the Mississippi had taught us that by care in all these particulars long marches could be made and the animals improved each day.

August 17.—Made 15 miles to-day, and camped on the Missouri at 2 o'clock. The road was over the level river bottom. Much side work has been done since leaving the Big Muddy by Lieutenant Grover, Mr. Lander, and Mr. Tinkham; and the meteorological observations have been as numerous since leaving the Big Muddy as they were on the route up to Fort Union. We organized to-day a day guard for the care of the animals, the object being to keep them in the very best grazing, without picketing, as long as possible. One mule died to-day.

August 18.—Passed through to-day villages of prairie dogs. Crossed the Porcupine river about five miles from camp. Encamped on the Milk river, 16 miles being the day's march. Here we determined to remain a day to prepare charcoal for the blacksmith, and to make observations for the geographical position of its mouth, which is considered a very important point in the survey. Our camp was surrounded by a large grove of cottonwood, (see sketches,) and near it was a delightful spring of water. The valley of Milk river is wide and open, with a very heavy growth of cottonwood as far as the eye can reach, which is also to be found along the adjacent shores of the Missouri. From the Big Muddy the road has been remarkably fine, and there was but one steep pitch which required care in descending with the train. There are, however, many little coulées along the route, where streams run in the spring to the Missouri and its tributaries, which would require bridging to make an easy and practicable road at that season of the year. From the slight examination made, the prairie country along

Stanley Del.

MILK RIVER, NEAR JUNCTION OF MISSOURI

Stanley del.

A COTTON WOOD GROVE

Stanley, Del.

Sarony, Major & Knapp, Lith. 449 Broadway N.Y.

MILK RIVER AND PANTHER-MOUNTAIN.

the route is not only well grassed, but much of it arable. This is emphatically the case with the bottoms of the Missouri, which our route followed. Occasionally there would be shingle and a spur to pass over.

CAMP ATCHISON.

At this camp, which I named Camp Atchison in honor of the acting Vice-President, I reduced to writing, and issued in an order the instructions for the government of the expedition and the distribution of duties, under which we had been moving by my verbal instructions from the Big Muddy river. I availed myself of this opportunity to express my sense of the services of the several members of my party. This order is given at length in pages 41, 42, 43, and 44 of volume first of the Pacific Railroad Reports, from which it will be seen that Lieutenant Donelson was assigned the duty of acting as the executive officer of the expedition; that he was instructed to take general charge of all the observations; and, referring to the astronomical observations, it was enjoined that great attention should be given to the latter, particularly to the observations by lunar distances and with the portable transit.

I have deemed it proper to refer to this arrangement with the more particularity, as on page 635 of volume first a letter will be found from Lieutenant Donelson protesting against my statement that "*at Fort Union the observations were placed in charge of Lieutenant Donelson, with instructions, if practicable, to get longitudes by lunar distances, but Lieutenant Donelson was not able to report any results, except for latitude.*" My statement I reaffirmed in a letter to the Secretary of War, and in one to Lieutenant Donelson, for whose truth and honor no man has a higher opinion or greater confidence than myself. I expressed surprise at the terms of his protest. My written instructions, however, show conclusively that Lieutenant Donelson was in error, and that my original statement is fully borne out by the written orders, the only error in the statement being that the order was written at Camp Atchison, instead of Fort Union; but the verbal instruction was given at the Big Muddy river.

On the 19th there was some little alarm in camp in consequence of false reports about the vicinity of a war party of Blackfeet.

We left Camp Atchison on the 20th, and after moving 15 miles, reached a very pleasant camp, with excellent grass, wood, and water. In the evening there was a very heavy thunder storm. My order, to which reference has been made, was read to the gentlemen of the party this evening, and was the subject of general congratulation and not a little mischievous by-play or joking.

August 21.—This morning was clear, cool, pleasant, and delightful for moving. Engineer parties, both yesterday and to-day, have been actively at work getting in the country bordering the route of the main party. The road, as usual, was excellent to-day. I despatched a small party across Milk river to Panther Hill (see sketch) to observe the country. Game was very abundant; plenty of buffalo, antelope, and beaver. A heavy rain and thunder storm occurred about noon. I finally concluded to abandon the instrument wagon, which had delayed us very much yesterday and to-day, in consequence of breaking down, and transfer the baggage to other wagons. Wild horses were reported as having been seen to-day by the reconnoitring parties. A fine eagle was shot and brought in to Dr. Suckley, our naturalist. To my exceeding regret, I found that there were points arising regarding the relations of army officers

and civilians, and I concluded that the only way to overcome all difficulty was to pursue a firm, steady course, according to the terms of my written order. The distance to-day was seventeen and two-thirds miles.

August 22.—The route to-day was not as good as it has been since we left Camp Atchison. There were some little spurs to cross, and the valley itself was occasionally interrupted by shingle. The first sage was seen to-day, though in small quantities. We crossed Milk river, five miles from camp, and took a cut off to the south. Thus far Milk river has had a very gradual descent and a somewhat sluggish current. We made our camp, after moving nineteen and a half miles, one quarter of a mile from the river, in the vicinity of a very heavy growth of cottonwood, there being a high bluff between us and the river. The water to-night was poor, there having been a high wind through the day, which affected the sands of the stream and made the water exceedingly muddy.

As usual, the evening was spent in considering the question of the proposed Blackfoot council, and our relations with the Blackfeet, and in examining the work of the parties, and preparing for the work ahead. We passed through large herds of buffalo to-day.

August 23.—We left camp late in consequence of the oxen straying, and about a mile from camp crossed Milk river. The order to walk some miles each day had been carefully observed, and the effect was to be seen upon our animals. On reaching our camping ground, which was in a hollow on Milk river, grass poor, and water some half mile off, we found a deputation of Gros Ventres, consisting of seven of their chiefs and principal men, five of whom were accompanied by their wives. Among these were the Eagle Chief and his son, White Eagle, and the Little Soldier. The wife of the son of the Eagle Chief was a very pretty woman. Her name was the White Antelope. They welcomed us in the most cordial manner and were dignified in their deportment, which was marked by the strictest propriety. We were invited to visit their camp, about thirty miles further on. As it was my desire to exhibit to them our confidence and wish to enter into perfectly friendly relations, I invited them to join the gentlemen of the party assembled around a large camp fire. After smoking and talking for some time, lunch was served up about dusk, consisting of coffee, rice, &c., after which they made us presents of horses, giving one to myself and two to Mr. Culbertson, to whom they seemed to be much attached. There was a large tent put up for their accommodation, and a supper was provided about ten o'clock.

As my health had now been rapidly improving for some days, I determined to push ahead as rapidly as possible with two advance parties, in order to examine the approaches to the mountains. Accordingly, I organized two parties under Lieutenant Grover, and Mr. Lander for the above purpose. To Mr. Lander I assigned four, and to Lieutenant Grover five members of the party. Each was provided with reserve horses, and with fifty days' rations of flour, sugar, and coffee. These arrangements delayed me, so that on the following morning, August 24, I got off somewhat late. We expected to reach the Indian camp to-night, but were obliged to go into camp $7\frac{1}{2}$ miles this side, where we found excellent grass and water. I determined to make our guard duty light. We had with us four gentlemen who could serve as officers of the guard, five men as non-commissioned officers, and seven privates. Our Indian friends were again with us to night, and we treated them with bread and coffee.

I learned to-day that a feud has lately broken out between the Gros Ventres and the Black

foot tribes. It is worthy of note, not only to commemorate the noble heroine who figures in it, but as it may become a matter of interest to our expedition and to emigrants coming over this route hereafter.

A Gros Ventre was married to a woman of the Blackfoot tribe. Travelling along, he was attacked, killed, and a fleet horse of his stolen. His wife was with him at the time, and the assassin immediately proposed that she should marry him, go northward, and the Gros Ventres would never learn of the death of one of their tribe. She assented. He gave her the slow animal upon which he had rode himself, mounting the fast horse which had been taken from her murdered husband. They soon arrived at water; she went off to get some, and on her return pressed him to go, as the water was very good. He did so, leaving his horse with the squaw. After he had gone some two or three hundred yards she mounted the fastest steed, and, pursuing a contrary direction, joined the tribe of her deceased husband and gave such information as would lead to the revenge of his untimely death. I find these Indians determined to revenge this outrage, and are now fitting out war parties for the purpose of cutting off straggling Blackfeet, and steal their horses.

The comet was quite large and very bright.

August 25.—Took an early breakfast, and got off about 7 o'clock, Lander and his party having arrived about an hour previously. They left camp last evening and travelled till dark, camping about 1½ mile back of us. Struck Milk river again on its banks; made a mid-day halt, where we lunched. Stopped an hour, and again went forward, making to-day 22½ miles, when we reached the camp of the Gros Ventres, on the bank of Milk river, at about 3½ o'clock. It was with much difficulty that we found grass sufficient for camping, as it had been eaten off by the large bands of horses belonging to the Gros Ventres, who had been in camp here some weeks. This camp consisted of 300 lodges, at least 1,000 horses, and over 2,000 Indians, men, women, and children. We were soon waited on by others of the tribe, dressed in their finest costumes, among whom I would name The Cloudy Robe, who presented me with a horse, The Eagle, Big Top, The Discoverer, or Ball in the Nose, The man who goes on Horseback, The White Tail Deer, The Running Fisher, The Two Elks, The Wolf Talker, The Bear's Coat, White Bear, The Clay Pipe-stem Carrier, The Old Horse, The Setting Squaw, The Little White Calf. They requested that none but our principal men should visit their camp this afternoon, in accordance with which an order was issued to that effect. Accompanied by the gentlemen of the party, I visited their camp and the lodges of the principal chiefs, at all of which we were treated with the utmost kindness and hospitality. They first received us at a large lodge prepared for the occasion, some twenty-five feet in diameter, within which some sixty were seated. We here smoked, drank, and ate, talked some time, and then visited the lodges spoken of. I was much struck with the prominent characteristics of this tribe. Polygamy is universal, several of the chiefs above named having four, five, and even six wives, one of whom is the especial favorite and mistress of the household. The husband will appropriate any of them to purposes of prostitution when he can profit by so doing. They appear to be a simple-minded race, easily influenced, and very kindly disposed towards the whites. They are filthy in the extreme in their habits, many of the women actually eating the vermin out of each other's heads and out of the robes in which they sleep. Being improvident, it is always feast or famine, either having abundance or else nothing. They furnished us to-night a mess made up

of buffalo marrow, berries, and the scraping of buffalo (lodge) skins. It was of course improper to decline. I therefore took the proffered plate in each lodge, and enjoyed it much, though some of our party either declined it or eat very sparingly. Returned to camp about 8 o'clock, and fixed the next day for a council.

THE GROS VENTRES.

August 26.—The Pembina train arrived shortly after breakfast, and the main train about noon. The necessary preparations were made to prepare the feast, and about 1 o'clock the Indians were seated in squads of twenty or thirty around, to the number of nearly two hundred. Before the feast the Indians seemed to be in high glee, passing the time in singing their songs, accompanying them with rattles made of the hoofs of antelopes strung very fancifully upon a piece of wood about a foot long, with which they marked time.

Shortly after the feast was over we had a council, at which the chiefs and many of the principal men, as well as several of the gentlemen of the expedition, were present. Mr. Culbertson acted as interpreter. When I first commenced talking with them I found they were deeply enraged against the Blackfeet for the cause alluded to in the journal of the 24th; that they were determined to wage war against that tribe; to fit out war parties of their young men to cut off straggling Blackfeet, and steal their horses. I determined to put an end to this, and at once made a proposition to them to settle with that tribe on their delivery of the offender, or making a suitable reparation. I then explained the folly of going to war, how much they would suffer from it, and how little was to be gained; that it was the desire of the Great Father at Washington that all his children should be at peace with each other; that while war parties of both tribes were scouring the country the road was dangerous to the whites who should go there, and it was my duty to demand that they should not so act as to endanger the life of a single man of my own party, or any white man who should hereafter travel through this region.

I then proceeded to explain the objects of the expedition in passing through their country and the motive which prompted this day's meeting. "No idle curiosity brings me here, no mere desire to see the country or the Indians, but I am charged with a great public duty, to deliver to you a message of peace and assure you of the kind feelings entertained by the Good Father at Washington, of his desire to learn the wants of his children, and to make inquiry as to what might be done to ameliorate your condition. To secure the continuance of his good wishes you must be at peace with one another. Some of you were present or know of the treaty of Fort Laramie. On that basis I wish to make a treaty of peace between the Gros Ventres, Blackfeet, Piegans, and Bloods, and between these and the Indians west of the mountains who resort to the plains of the Missouri to hunt the buffalo." I then proceeded to explain the advantages which would arise to the Indians from entering into such a treaty and receiving from the government directly what they now get from other Indians. They would then obtain goods, provisions, &c., in the way of annuities; could keep their horses, instead of being obliged to go with their horses and purchase of other Indians, at an increased price, what the liberality and benevolence of the Good Father, in his fostering care over his children, would at once freely and abundantly supply them. I dwelt upon these and other advantages to them, and closed by insisting upon their reflecting upon these matters. "Think well of the

Stanley Del.

Sarony, Major & Knapp Lith. 449 Broadway, N.Y.

DISTRIBUTION OF GOODS TO THE GROS VENTRES.

matter. Suspend for the present your difficulty with the Blackfeet Indians. Let some of your principal men come with me to Fort Benton and we will try to settle the difficulty between the tribes. If it cannot be settled there let it be referred to a commissioner appointed or sent here by the Good Father at Washington, who will settle all your differences at a council of the tribes to be held next year, where the grievances of both parties will be fully heard. But I must insist, as before stated, on a safe conduct of every white man through this country."

I again advised a peace between all of them, and soon after, the first meeting broke up, without any answer to my propositions or suggestions.

They then held a consultation with their braves, warriors, and principal men. In about an hour we again met. They assented to every proposition made. Some of their chiefs consented to accompany me to Fort Benton, and the whole tribe announced their willingness to wait until some time next year and refer their difficulties to such a council as was spoken of, to be held at such a place as should be hereafter designated. We continued the talk for some time, after which the Indians were invited to come over to the camp of the main party and witness the firing of the howitzer, which seemed to give them much pleasure, my explanation creating in their minds much surprise. The Indians around camp behave with great propriety. I have not yet heard of the smallest article being missed, although they are seated around everywhere, and many loose articles are lying about.

They express great friendship for the whites, and evince the kindest feeling to our men. About 5 o'clock we made a distribution of the presents and provisions designed for this tribe, consisting of blankets, shirts, calico, knives, beads, paint, powder, shot, tobacco, hard bread, &c.—(See sketch.) They received them with the greatest satisfaction; no grumbling or envy was manifested among them. They continued about our camp, loitering, smoking, and talking all the afternoon and evening.

The comet spoken of a day or two ago appeared to-night, shining most brilliantly in the northwestern portion of the heavens, and the aurora borealis presented a beautiful appearance. At 9 o'clock I caused three more rounds of the howitzer to be fired.

The camp of yesterday and to-day we have named Camp Armstrong, in honor of Robert Armstrong, esq., editor of the Daily Union.

In the course of the day I was much gratified with the proposition made by Lieutenant Grover, for a party to remain at Fort Benton and cross the Rocky mountains in the worst winter month, say January, with a dog train, to ascertain the depth of snow, and such other facts in regard to the crossing when the greatest obstacles are presented. He volunteered to take charge of the service with six men.

August 27.—Busy this morning in endeavoring to effect the purchase and exchange of horses with the Indians. We secured several very good horses in place of six very indifferent mules, which could not possibly have been used before reaching Fort Benton, and some of them not for months. Several members of the expedition bought horses for clothing, guns, &c., their private property, thus relieving for the use of the expedition their present riding animals. By the distribution of presents and provisions, and consumption at camp, we lightened our loads some 2,000 weight, apart from the issues to the detached parties, and have received some eleven or twelve serviceable animals in place of unserviceable ones, besides some four new

ones purchased by members of the party, two presented to me, and two purchased by Mr. Culbertson.

Moved about noon, and after making seven miles went into camp; wood, water, and grass excellent; the main train came to within a half mile of us.

Lieutenant Donelson suggested this morning that he should be placed in charge of a party at Fort Benton to go northward to the Edmonton House, taking a cross section of the whole mountain range, cross the Rocky mountains in that latitude, explore the sources of the Columbia, come down it, making its survey, and connecting it with our work. I feel much gratified at such marks of interest in the expedition as are shown by such propositions, and only hope it may be practicable to carry both into effect.

August 28.—I made, to-day, twenty-four and a half miles with the advance parties. For the greater portion of the route, the road was very level and the grass excellent; but as we approached camp there were some hills and coulées to cross. We happened to make a camp with bad grass, although within a few miles we had passed several camp spots with very excellent grass. I was very much pleased with the good offices of The Running Fisher to-day, who brought into camp two of our missing horses. By my invitation he will accompany us to Fort Benton.

According to the best information which I can obtain from the Indians, Cypress mountain must be some 120 miles north by the road they travel, and some 70 or 80 miles in a direct line. It is, therefore, in British territory.

I determined to-day upon Lieutenant Grover's field of duty, which was, first to cross the mountains by Cadotte's Pass, open a connexion with Lieutenant Saxton and the western division; then to return to Fort Benton, make a survey of the upper Missouri to connect with the survey made by Lieutenant Donelson; thence to return to Fort Benton by the route between the Milk river and the Missouri, make the best examination of the country his means afforded, and starting from Fort Benton in the winter to cross the mountains with a dog train, and determine the character of the snows and winter climate between Fort Benton and Puget Sound.

August 29.—The road to-day was not as good as usual; the river bottom was much dried up, with deep cracks in the soil, and the numerous holes made by the prairie dogs were even, at times, a worse obstacle to our progress. The presence of Indians with us led to many inquiries respecting them.

Mr. Culbertson estimates the number of Gros Ventres at about three hundred lodges, ten persons to the lodge, of which the proportion of men to women is one to two, the number of men being about six hundred. On his arrival in the country, some twenty-three years ago, they numbered about four hundred lodges. In 1838–'39, by a junction of the Crees and Assiniboines, some sixty lodges were entirely destroyed at Julius mountain. A few years subsequently another attack was made at Cypress mountain, in which sixty more lodges were exterminated, three men only escaping on this occasion one of whom was the Setting Squaw, father of the one mentioned in the journal of the 25th. From Mr. Culbertson I also learned that in 1833, soon after his arrival in the country, he and four or five other whites, with a party of Blackfeet Indians, were attacked by a war party of Assiniboines, numbering some seven or eight hundred. The field was contested all day, night only ending the conflict. In

BEAR'S PAW.

the morning, however, the Assiniboines did not resume the attack, and abandoned many of their dead on the field. A considerable number of Blackfeet were also killed, but none of the whites.

Made our halt about twelve miles from camp, where we dined, resting from about half-past 10 till 1 o'clock. By an accident, the wind being high, the prairie took fire, and extended over considerable surface. Our dining place was on a branch of the Milk river flowing from the Cypress mountain. Its channel and drift marks, though dried up now, indicate that at the season of freshets it is quite an important stream. Parallel to this, and some three miles further on, crossed a second branch, issuing also from the Cypress mountain. By a bend the two branches nearly meet, forming what is called the junction.

August 30.—Yesterday we were in sight of the Bear's Paw, quite a broad and rugged mountain upheaval, stretching from Milk river to the Missouri.—(See sketch.) From the best information which I can gain of these mountains, they are intersected with valleys which give easy passes for pack animals, and probably no difficulty would be found in getting through with wagons. I sent off Lieutenant Grover, Mr. Lander, and Mr. Stanley to make an examination of the Bear's Paw, as far as it could be done by ascending one of its highest peaks, and also to sketch in the whole surrounding country, especially the portion between the Bear's Paw and the Rocky mountains. We estimated our distance from the peak of the Bear's Paw which they would ascend to be about seventeen or eighteen miles. I moved on myself with the remainder of the party, having determined that I would no longer ride in the ambulance, but would make the effort to push forward either on horseback or on foot. After moving seven or eight miles I suffered so exceedingly from riding that I walked some five or six miles, with great difficulty, until coming to a good camp on our second crossing of Milk river, and the point where we were to leave it on our way to Fort Benton, I halted the party and rested for some two hours. This gave me strength enough to mount my horse and ride to camp, eighteen miles further on, on a tributary of the Box Elder creek, and in a straight direction from where we left Milk river. After leaving Milk river we crossed several branches of the Box Elder creek, which is a tributary of Milk river that has its source very near the Missouri, and is on our general line to Fort Benton. The ascent is very gradual from Milk river to our camp; the soil generally is very good. The view this afternoon was delightful. Bear's Paw itself presents a rugged, grotesque appearance, and it requires no great stretch of the imagination to see in it the paw of a grizzly bear, ready to spring upon the plain.—(See sketch.)

The Three Buttes, or the Sweet Grass hills, some sixty miles to the northward of us, is a favorite resort of the Blackfeet, who say that Providence created these hills for the tribe to ascend and look out for buffalo. Southward we have a view of mountains on the other side of the Missouri. Our distance to day was 29½ miles.

I had forgotten to mention that at the upper portion of Milk river, for some thirty miles, the water appeared only in pools, but it was exceedingly cool, delightful, and pure, and was evidently running water. There is a singular fact connected with all the streams of this country, which become dried up in the summer and fall, that as soon as the cold weather comes on the water rises in the streams, and the usual quantity passes down. The fact is, the streams do not dry up; only in the summer and early fall their course is in the sands, and by sinking wells the purest and clearest water would be found at a depth of from two to three feet; and I have

no doubt, from my own personal observation, that ample supplies of water would, in the driest season, be afforded by Milk river for the largest emigration, or for the largest business of a double track railroad.

I felt some apprehension in relation to the safety of Messrs. Lander, Grover, and Stanley, as they did not reach camp to-night. I will here state that, before leaving the main party at the Gros Ventres' camp, verbal instructions were given to Lieutenant Donelson to detach Mr. Tinkham, on his reaching the point of departure from Milk river, to make an examination of the Three Buttes, and of the country generally between the Milk river and the Marias.

August 31.—We made an early start this morning, moving off first with the wagons, and leaving the pack animals behind for an hour to feed. We had a shower, accompanied by lightning, before sunrise; crossed several coulées in the course of the morning, and in twelve miles came up to the upper waters of the Box Elder creek, which is a clear, limped stream, affording an unfailing supply of water. We then pushed on some five miles, over a fine rolling prairie, to a coulée in the hills, where there was a spring; and here we halted to dine. This spring is a great resort for buffalo. Considerable water flows from it, but the ordure of the buffalo was in such great quantities about it that it infected the water, and, moreover, they had trampled all the ground, and had stirred up the water of the spring with their feet. We, however, thought it would do well enough for us to make coffee, and we accordingly managed to get up a very respectable meal. After stopping three hours we continued on over a very good road. There was a shower of rain and hail about 4 p. m. At 5, the Missouri was in sight, the Belt mountains looming up beyond it, at a distance of not less than fifty miles. After a march of 33 miles from our morning camp, we came to a place called the Springs; here the water was dried up, and there was no wood, but very excellent grass. We pitched our camp in a coulée surrounded by high bluffs, and went to work to dig wells for water, in hopes to procure some for our animals. We succeeded in getting only a small quantity for each. There was a very high wind and a heavy thunder shower until near midnight. Most of us had to go to bed without our suppers. Our Indian friends assisted us very much in the night in looking out for our animals. Grover, Stanley, and Lander have not come in, which gives me a good deal of apprehension. The Running Fisher told me a story to day, illustrating one of the phases of Indian life. The Bear's Paw, as one would infer from its wild and stern appearance, has been a scene of Indian fight and massacre. Seven years ago a fight occurred in the Bear's Paw between their tribe, allied with the Blackfeet, and the Crows, in which he killed one of the latter tribe. The Crows occupied an impregnable post, from whence they could shoot down all who approached within twenty paces. A Blackfoot was shot in the head through a fissure in the rocks. The Gros Ventres then determined to surround and starve them out; at night the Crows got off with the loss of one man, killed by Running Fisher.

September 1.—This morning we made an early start, and crossing over a high rolling prairie, in 11¾ miles came to the Marias river. The descent to this river on the trail is somewhat steep, the prairie plateau being some two hundred and odd feet above the river bottom. The river itself here presents a beautiful view. It is a clear, limped stream, flowing over a pebbly and sandy bed, the bottoms lined with cottonwood of heavy growth, with thickets of the service and other berries. The Belt mountains are very distinctly visible in the distance, as is also Citadel Hill, called so because its base rests upon the Missouri, and it rises perpendicularly like a bastion, some two hundred feet high. Near by is Square Hill, so called from its

supposed resemblance to that geometrical figure. These and other elevated points will enable us to get a view of the approaches to the Rocky mountains.

At our noon halt, or near by, was the scene of a sanguinary conflict between the Gros Ventres and the Crows, in 1849, in which the latter were all killed. Several of those travelling in our company figured in the action. A party of Crows to the number of twenty-two were concealed in the hollow just in advance of where we dined, for the purpose of stealing horses from the Gros Ventres' camp, consisting of two hundred lodges. Being discovered, the Gros Ventres surrounded them and threw up dust in the air, which was carried by a strong wind in the faces of the Crows, blinding them, when the Gros Ventres rushed upon them and killed the whole number without losing a man. Among the Crows was a Gros Ventre who had been taken prisoner in early life. He begged for his life, told who he was, but against him very properly they executed their wrath, telling him he had no business to come on such an errand against his own people. The Crows fought bravely; one of their number, with knife in hand, jumped down a hill some sixty feet, but was despatched before he could do any injury. None were left to carry home the news.

We were off about noon; passed over the prairie, and descended in the valley of the Teton, where we met Mr. Clarke, in charge of Fort Benton, who came out to meet us. The express which I had despatched from the Big Muddy reached Fort Benton in due season, and had gone back to meet us; but having taken the route through the Bear's Paw mountain, they struck our trail in our rear and had not yet come up with us. We arrived at Fort Benton at 3½ o'clock, where we were received with a salute of fifteen guns.

CHAPTER V.

FORT BENTON.

Reports on the crossing of Mountains made by Voyageurs and Indians.—Itinerary of a Wagon Road from Fort Benton to Bitter Root Valley by the White Crane.—Voyageur Hammell's account of Cadotte's Pass.—Description of Forts Benton and Campbell.—Return of Lieutenant Grover's party.—Incidents of their trip.—Their suffering from hunger.—Are relieved at Lieutenant Donelson's camp.—Mr. Stanley takes Daguerreotypes of the Indians.—Their ideas concerning him.—Lieutenant Grover despatched to Bitter Root Valley.—Dr. Evans arrives from Fort Union.—Report of his route.—A Blackfoot Council proposed.—Little Dog and Marias Pass.—Rotten Belly Rocks.—Origin of the name.—Despatch from Lieutenant Grover.—Return to Fort Benton.—Report of Lieutenant Saxton.—Arrives at Fort Vancouver.—Reaches the Dalles.—Organization of his party.—Leaves the Dalles.—Crosses the Des Chûtes River.—Deputation of Cayuse Indians.—Excessive heat.—Walla-Walla River.—Fort Walla-Walla.—Antoine Plante.—Pu-pu-mux-mux.—Snake River.—Peluse River.—Delegation of Peluse and Nez Percés Indians.—Eloquent Speech.—The only mercurial Barometer broken.—Spokane River.—The Spokanes and their Chief.—Coeur d'Alêne Prairie.—Pend d'Orielle Indians.—The whole region densely wooded.—The Valley of Clark's Fork.—Thompson's Prairie.—Crossing of Clark's Fork.—St. Mary's Village in the Bitter Root Valley.—Lieutenant Macfeely returns to Fort Vancouver.—Lieutenant Arnold left in charge of the Depot.—Lieutenant Saxton starts for Fort Benton.—Hell-Gate.—Impropriety of the name.—Description of the country.—Its adaptation to be the great highway.—Meets Lieutenant Grover.—Their arrival at Fort Benton.—Mr. Tinkham returns to Fort Benton.—Incidents of his trip.—Mr. Stanley ascends the Three Buttes.—Monuments on the summits.—Botanical and Geological account.—Panoramic view.—Beds of Lignite and Coal.—Marias River.—The Trunk.—The Knee.—Teton River.—Governor Stevens resolves to substitute pack animals for wagons.—Mr. Doty is left at Fort Benton.—Meteorological Post.—Mr. Doty directed to hold a Council with the Western Indians.—Return of Mr. Stanley.—Report of his trip to Milk River.—The Piegans.—Cypress Mountain.—Pa-ko-kee Lake.—Old Indian Fort.—Bow River Valley.—Low Horn, chief of the Piegans.—Moving Camp.—Dogs.—Leaves Indian Camp with a Deputation for Fort Benton.—Partial Vocabulary.—Sketches.—Talk with Blackfeet, Piegans, and Blood Indians held at Fort Benton.—Interpreters.—Their duties.—Description of Indian dresses and arms.—Complaints of the Chiefs.—Speech of Governor Stevens.—Reply of Low Horn.—Distribution of presents.—Speech of Low Horn to his Braves.—Idea of Peace received with satisfaction.—Separation of the party.—Lieutenant Saxton directed to report at Washington.—Lieutenant Grover to examine the Missouri.—Tribute to Mr. Doty.—Result of sojourn at Fort Benton.—Governor Stevens leaves Fort Benton.

September 2.—I was occupied to-day in interrogating voyageurs and Indians in regard to the passes of the mountains and the general character of the country, and also in buying and exchanging horses to fit out the advance parties. Of the many Blackfeet Indians that I questioned, only one had crossed the mountains to the Bitter Root valley as late as November. Their surmises as to the depth of snow on the passes were very different. Some were of opinion that the snow would be so deep in the second moon after this that the route would be utterly impracticable. One Piegan, the Three Bears, told me there would be snow in the mountains the latter end of October. I asked him the question whether there would be snow on the trail or on the mountains peaks, and he said simply on the mountain peaks. A Blood Indian, the White Crane, gave me the following itinerary of a wagon road from Fort Benton to the Bitter Root valley, which I give entire, as the accuracy of it has been subsequently established by the surveys of Lieutenant Mullan. Blood Indian, White Crane, says that the Flatheads, who travel fast, can go to St. Mary's in four days, say from fifty to sixty miles per day. Same Indian says it would take us thirteen days with wagons. Road good except one or two hills requiring attention.

FORT BENTON

He would go to Sun river in three days, keeping at the head of the coulées leading into the Missouri river. First night he would encamp at a spring; second night at a lake; water good, but no wood; third night on Sun river. He goes up Sun river one day and strikes towards the mountains. Four days to ridge, where difficult parts occur; plenty of wood; water and grass improving all the time from this point. Ninth day.—Ascent to ridge difficult, requiring labor for wagons; descent good; camp on a stream, tributary of the Missouri, but west of this mountain. Tenth day.—Pass over a level plain and camp on another tributary of the Missouri, called the Red Shell river. Eleventh day.—Go over Prickly Pear prairie and reach foot of next dividing ridge. Twelth day.—Go over dividing ridge and reach a creek which flows into the Columbia. Pine timber, no rocks, and good road through. Thirteenth day.—Follow creek down, and camp a little distance this side of its entrance into the large river. Fourteenth day.—Follow creek down to Big river, and then follow Big river; it is a plain, good road. From this point it takes seven days of slow marches, good road, to go to the St. Mary's village.

These Indians whom I interrogated had frequently crossed over to the upper waters of the Platte and Snake rivers, and they informed me that the whole country was open, and that there would be no difficulty in moving from Fort Benton, over quite a number of trails, to the emigrant route from the States, *via* Fort Laramie and South Pass, to Salt Lake; and they described the country as being, for the most part, a very desirable one, excellent for voyaging, and abounding in wood, grass, and water. The voyageur, Hammell, gave me the following account of Cadotte's Pass:

Hammell says: "Follow the general course of the Missouri till you strike the Sun or Medicine river, a distance equal to three days' journey of 24 miles each. The road is good, but you have to make such marches as will enable you to meet certain springs, in order to secure good camping places."

"Medicine river is followed in the valley some 50 miles, when you reach the mountains. Good roads; timber plentiful, and grass good."

He estimates Cypress mountain to be three days' journey from this point, of forty miles each, a little east of north. From that point to the Koutenay country the distance is eight days for Indians with fast horses, and ten days with slow horses. I began, now, to feel a good deal of apprehension in consequence of not hearing from the missing gentlemen who visited the Bear's Paw, and it seriously interfered with my views in regard to sending forward advance parties. I visited to-day the post of the other company, and will take this occasion to describe Fort Benton and Fort Campbell, together with the neighboring country.

Fort Benton (see sketch) stands on the eastern bank of the Missouri, near the Great Bend, and 377½ miles by the trail taken by me above Fort Union. The river is here perfectly transparent at most seasons of the year. The Teton river empties into the Missouri six miles below Fort Benton; the Marias river twelve miles below; and Milk river 200 miles below. The Falls of the Missouri are 18 miles above this fort. The muddy character of the Missouri has its commencement at the mouth of Milk river, which takes its name from the whitish muddiness of its waters. The ascent from the wide grassy plain in which the fort is located to the high table-land is somewhat abrupt, the only passage on a level with the plain being close to the river on the south, and very narrow. Fort Benton is smaller than Fort Union. Its front is made of wood, and the other sides of adobe or unburned brick. It usually contains about

a dozen men and the families of several of them. Its general arrangements and purposes are of like character with those of Fort Union. The Blackfeet Indians are the principal traders here. It is the custom of the several bands of this tribe to locate in sheltered and otherwise eligible places, in the vicinity of wood, water, and grass, in the early winter, where they remain as inert as possible until the melting of the snow. At such times the half-breeds of the fort visit them, with goods upon horses and mules, and exchange their merchandise for the skins and furs captured by the Indians.

Fort Campbell is situated on the same plateau with Fort Benton, about half a mile above it, and is built in very much the same way as the latter place.

September 3, 1853.—I made arrangements this morning to send an express to Lieutenant Donelson, directing him to make the necessary arrangements to search for the missing gentlemen of the party, and as the express was about setting forth, I was agreeably relieved from its necessity by their coming into the fort. They were in fine spirits, although they had eaten but little food since they left me on Milk river, had travelled a very long distance, partly on foot, and had been a good deal annoyed by the loss of so much time at a very important point of the progress of the survey.

TRIP OF MESSRS. GROVER, LANDER, AND STANLEY.

The incidents of this trip are as follows:

At 8 o'clock on the morning of the 30th of August, Mr. Stanley, in company with Lieutenant Grover and Mr. Lander, left the advance party on the left bank of Milk river, and crossing the stream, ascended a prominent spur of the Bear's Paw range of mountains, about six miles from their point of departure, the understanding among them being that I would not cross the river until noon, when they were to join me. Mr. Stanley having made a couple of sketches, (before referred to,) and noted the more striking characteristics of the surrounding region, they descended at an angle that would have led them to my trail if I had passed over at the hour they had understood to be designated; but finding no trail on the right bank, they concluded that I had not yet crossed, and they accordingly returned to the left bank and travelled in a more northerly course, in the hope of falling in with me. I had forded the stream, however, much earlier than they had expected, and had halted for the noon repast in the rear of the place at which they sought my trail, and soon after crossed their track without distinguishing the recent footprints of their three horses from the others which they had themselves noticed.

Finding no trail on the northern margin of the river, they ascended the bank and proceeded about six miles up the stream, when, seeing in a southerly direction what they supposed to be smoke, and readily concluding that it arose from my camp, they changed their course, but before reaching the valley of Milk river they saw other like appearances, which they were then able to determine to be dust and not smoke. Night was now upon them, and they were constrained to halt. Their horses found abundance of grass here, as elsewhere throughout this region, but they were without food, without blankets, and even without coats, and the nights were unpleasantly cold.

On the morning of the 31st they early resumed their search for the trail. After going up the valley about three miles they entered a dry fork of Milk river, which they crossed three

miles further up, when they ascended the left bank and took a course east of north for twelve miles to a divide. Here, after a short halt, it was determined that they should return to where they had separated from the party in the vicinity of the Bear's Paw, although Mr. Stanley's judgment was in favor of proceeding on their way with a more southerly inclination; that is to say, by inclining more to the left until they should reach the Missouri, which they subsequently ascertained would have been their true course. But having no ammunition, and as it was not unlikely that they might fall in with a party of Blackfeet Indians in their approach to the Missouri, of whose friendly manifestations they could have no better guarantee than their ability to protect themselves, and considering all the circumstances of the case, the resolution formed was deemed the more prudent, especially as it was certain that they could at the Bear's Paw discern, and from that point follow, my trail.

On this morning two antelopes appeared in view; their desire to slay one of them was intense. Every conceivable precaution was adopted, and Mr. Stanley was selected to fire the only gun. Lying upon his face within a buffalo wallow, and taking advantage of the well-known curiosity of this animal, he displayed a handkerchief in the manner of a flag to decoy him, and held the gun in position. He approached warily, and Mr. Stanley as warily awaited his coming. The moment to fire was as soon as his eyes could be perceived above the intervening irregularities of the ground, and before he should take fright from the glance of the hunter. He fired at this moment, and missed him! His anxiety had been too great for the perfect poise demanded by the crisis. The messenger passed too high between his ears, and his life was spared, while they were doomed still longer to endure the pangs of hunger.

They suffered much throughout this day, and at 10 o'clock in the night halted for rest. At midnight the wind blew violently, when they arose and lighted a fire with one of the only two matches in their possession. At daydawn they resumed their journey down Milk river and soon found the object of their search—the trail of the advance party. They started upon it in good heart, resolving that they could and would fast for the three days required for the journey to Fort Benton. The import of this resolution was, that though they might suffer from extreme hunger, their valued horses should not be sacrificed for food, and yet they were already very weak. Little did they then anticipate the relief so providentially near them. Within three miles lay encamped upon their road the main party of the expedition, under the command of Lieutenant Donelson. Their greeting was cordial as they approached, and all their wants were soon supplied. At 10 o'clock they were again on their way, with fresh horses and three days' rations, and a guide similarly furnished. In the evening, after a most harassing ride of 25 miles, they encamped on a southern fork of Milk river.

On the 2d of September they followed my trail until noon, but as it proved indistinct, and as their guide professed to be competent to conduct them to the fort, they followed him beyond the Marias river, when they soon found that he was entirely unacquainted with the country. Late at night they encamped on the Teton river, supposing it to be the Missouri; but at daylight on the 3d they were convinced that they were not on the Missouri, but had travelled too far to the right and gone beyond Fort Benton; they, however, finally reached the fort at noon, just as a command of fifteen men were about to depart in search of them.

September 4.—I concluded not to push off the advance parties to-day, as many of the animals required rest. Mr. Stanley commenced taking daguerreotypes of the Indians with his apparatus. They were delighted and astonished to see their likenesses produced by the direct action of the sun. They worship the sun, and they considered that Mr. Stanley was inspired by their

divinity, and he thus became in their eyes a great medicine man. Yesterday and to-day I was also much occupied in examining Indians and getting information of the country.

September 5.—The necessary arrangements having been made last evening, Lieutenant Grover started about 11 o'clock to-day to open the communication with the western parties. He was instructed to cross the mountains, proceed to the Bitter Root valley, ascertain if Lieutenant Saxton had established the depot of provisions at that point; and in the event of not meeting Lieutenant Saxton, he was directed to continue on to the Koutenay post, in order to get information of the whereabouts of Captain McClellan. From that point he was to despatch an express to Captain McClellan, informing him of our arrival at Fort Benton, and return immediately to that point. The field of duty which I have mentioned in the previous part of this narrative as that which I had determined to assign to him was now set forth in orders, and I congratulated the expedition that a gentleman of his known energy, ability, and good faith, could be availed of in the determining of such important facts as the navigability of the Upper Missouri, and the obstructions to be expected from snow during the winter from Fort Benton to Puget Sound. Dr. Evans also arrived to-day in fifteen days from Fort Union. He took the route between the Milk and Missouri rivers, passing through the Bear's Paw, and reports having found many delightful, well grassed, and arable valleys in this mountain, and that indeed generally, between these two rivers from their junction, the country was exceedingly well adapted to voyaging; water, grass, and wood, to be found at short distances, and much of the land he represents as being arable. The Doctor made a large collection in the Mauvaise Terre, and made quite a circuit on his way to Fort Union, finding a large extent of country between Fort Pierre and Fort Union, south of the Missouri, a prairie country instead of a country of hills and mountains, as had been generally supposed; grass not only good, but the country emphatically cultivable. This strip of country stretches southward some fifty miles from the Missouri.

Indeed, I am now impressed with the opinion, which I have got from various sources, that there is a large extent of country, cultivable, both north and south of the Missouri, especially as you approach the mountains in the neighborhood of the Yellowstone and its tributaries, particularly the tributaries flowing into the Yellowstone from the south side, until you reach the South Pass emigrant trail.

From Dr. Evans's representation of the grades of the route between the Milk and Missouri rivers, I became anxious to run a line of levels, because a good practicable route might be found that would considerably shorten the distance of the route pursued by us. Mr. Lander was busily occupied to-day in fitting out his party for the survey of the Marias Pass, in reference to which I also gained some general information that satisfied me of the existence of a pass in that quarter. Since I have given my attention to the passes of these mountains, I have been greatly impressed with the fact, from the course of the streams and the general deportment of the country, that there must be a good and practicable pass leading from some branch of the Marias; and at this time I was sanguine that we should find there the best solution of the question of the railroad practicability of the Rocky mountain range. I preferred, however, to move the main train, and to make the observations upon some line, in regard to which our information was so definite that we could be sure that the expedition could reach its destination this fall, as it would be very easy to connect side lines with the line of the main train, for the different gentlemen in charge of detached parties were assisted by men who were both able to run compass lines, sketch in the topography, and were provided with barometers and

assistants to take altitudes. I gave Mr. Lander authority, with certain exceptions, to select his animals from my whole train, deeming it important that he should be exceedingly well fitted out, as he would probably have a long distance to make before he joined the main party in the valley of Clark's Fork.

September 6.—The main party, under Lieutenant Donelson, reached the Teton early this morning. Nothing unusual occurred since I left them, except that they were at one time in great danger from a prairie fire, which, however, was checked and everything saved by the good arrangements of Lieutenant Donelson and the energy and exertions of the party. On leaving Milk river he halted a day to fit out Mr. Tinkham for his reconnoissance of the Three Buttes, and the country thence along the mountains to Fort Benton. The animals came in in very excellent condition, considering that they had moved some eleven hundred miles from the Mississippi; and I determined at once to push Lieutenant Donelson ahead with a small party of some twenty-five men, in order to reconnoitre the approaches to Cadotte's Pass. The train was to follow some days subsequently, it being important that the animals should have a few days' rest; and believing, from the information before me, that it was entirely practicable, by vigor and good judgment, to push our wagons through, I made such arrangements as left Lieutenant Donelson free to make the survey, and devolve the charge of managing the supply train upon Mr. Osgood, the acting quartermaster. As will appear hereafter, these arrangements were not carried out.

It seemed important that I should visit the main camp of the Blackfeet near the Cypress mountain, confer with their chiefs in regard to the contemplated council at Fort Benton next year, and secure guides for the survey of the Marias Pass. I expected, after accomplishing this, to be able to overtake the main party before it reached the Bitter Root valley, and probably by the time it was ready to cross the divide of the Rocky mountains. I desired, also, personally, to examine the approaches to, and the entrance of, the several passes of the mountains from our parallel southward.

September 7, 8, 9.—I was occupied these three days in preparing instructions to Lieutenant Donelson, conferring with Dr. Evans, our geologist, and making my reports to the War Department and the Indian commissioner; and I very frankly and explicitly stated that to continue the survey, and to carry out the instructions with regard to the work to be accomplished, it was absolutely necessary to incur a deficiency; believing that if the facts as they existed were known to Congress and the department, their instructions would be for me to continue the exploration, I determined to incur the deficiency and to make the survey. My instructions required me to examine into the question of the snows on the route, into the freshets of the streams, and the period of time they were locked up by the ice; to do which it was indispensable that there should be winter posts established at Fort Benton and in the Bitter Root valley, and it was desirable, in connexion with these posts, to have such arrangements made and such facilities afforded as would enable the gentlemen in charge of them to continue the explorations of the passes and the adjacent country. Being satisfied that this Indian council would have a weighty influence in the whole question of emigration on this route, and of any operation which might be undertaken by our government and its citizens, either in the way of wagon roads or railroads, I urged the matter of a Blackfoot council upon the Indian department. Lieutenant Mullan, who had accompanied Lieutenant Donelson up the Missouri, and had assisted in the observations from Fort Union to Fort Benton, I assigned to the duty of visiting the Flathead camp, supposed to be on the Muscle Shell, to convey to them a message of peace

and good will; to express my desire to make a permanent peace between them and the Blackfeet, and to build up anew their beautiful St. Mary's village. Lieutenant Mullan's party consisted of Mr. Burr, Amstant, Levi Nichols, and Frank Genette, voyageurs, Peter Martin, hunter, and White Crane, Indian guide.

He was instructed to procure from them experienced guides, and to examine some good pass, of which several were known to exist, leading from the forks of the Missouri to the Bitter Root river. From the Little Dog, a prominent chief of the Piegan tribe, and a man of character and probity, I got a very particular description of the Marias Pass we were in search of. From some superstition of the Blackfeet, it has not been used for many years, but formerly it was almost the only thoroughfare made use of by the Indians in passing from one side of the mountains to the other. It is a broad, wide, open valley, with scarcely a hill or obstruction on the road, excepting here and there some fallen timber. At present the Little Dog described it as being much grown up with underbrush; though the trail was visible and well marked on the ground there would be some labor for a train to make its way through, and it might be necessary in some few places to cut out the road. I gave my instructions to Lieutenant Donelson on the ninth instant, inspected the train, found everything in good order, the men cheerful, satisfied, and confident as to going on, and the means of transportation ample, and set off towards night, having been preceded a few hours by Mr. Lander, on the way to Cypress mountain. I camped that night on the Teton, fourteen miles from Fort Benton. Perhaps these instructions to Lieutenant Donelson have been sufficiently referred to, but the importance of starting at once with the advance party was impressed upon him, as it would be necessary to move slowly, perhaps halting every other day, in order to get that full knowledge of the country approaching the mountains, which was essential, in order to lay down our railroad line to the best advantage. I will here remark, that besides the party of Mr. Lander, I was accompanied by Mr. Culbertson, special agent, Mr. Stanley, artist, Augustus Hammell, interpreter, and three voyageurs.

September 10.—We had been joined last evening by a considerable party of the Blackfeet, who accompanied us to-day; the principal men being the Little Dog, the Three Bears, and the Wolf that Climbs. Started before seven, and after travelling some three hours reached a fine spring, with excellent grass, at a celebrated landmark known by the name of the Rotten Belly Rocks. It is a formation of sandstone, and has the characteristic of the Mauvaises Terres.

Columns with capitals, resemblances to the human figure, &c., &c., abound. Beneath, in the coulée, passes the broad Indian trail leading to the Piegan camp. Here was killed Rotten Belly, the Crow chief, in an encounter between one hundred of his braves and eleven well-armed Gros Ventres of the Prairie.

This celebrated chief, urged on by his people, had previously beleaguered Fort McKenzie. He captured all the animals of the fort, thirty-five horses. The place was in charge of Mr. Culbertson, and there were but nineteen men to defend it. For a month this little force baffled all the attempts of the Crows to get possession of the fort. Being, however, in a starving condition, and it being apparent that it could not hold out much longer, resort was had to stratagem. All the squaws, twenty-nine in number, were dressed in men's clothes, and with arms in their hands, were distributed around the fort, in sight of the Crows, who, thus deceived in reference to the force defending the place, became disheartened, drew off and separated. Rotten Belly, with a portion, mortified at his failure, declared he would go north and seek death

CROVERS DESPATCH — RETURN OF [illegible] [illegible] TO FORT BENTON

in battle. On reaching the rocks and seeing the Gros Ventres, he said: "Here I will die to-day, you have brought me to this," and rushing upon his enemies he killed two, and then received his death wound. Before his death he advised his people to be the friends of the whites, saying it was their only chance to escape defeat and utter ruin.

Kept on through the afternoon, passing over a rolling country, tolerably grassy, occasionally crossing hollows where water runs in the spring, and reached the Marias about half-past four o'clock, when we camped. This stream at our crossing was about fifty yards wide, one foot deep, and of somewhat rapid current, and the river valley was about a mile wide. There was plenty of cottonwood, and we had a most excellent camp. Spent the evening in conversation with the Indians who accompanied us.

EXPRESS FROM LIEUTENANT SAXTON.

September 11.—We were off about seven o'clock, and after travelling until near noon, halted at a spring, where we procured a small supply of water. Here I lost my pistol, (Colt's revolver.) Continuing on without unsaddling, in less than an hour I was overtaken by Baptiste Champagne with an express from Lieutenant Donelson, enclosing a brief report from Lieutenant Grover, to the effect that Lieutenant Grover met Lieutenant Saxton near the dividing ridge, and that they were returning together to Fort Benton.—(See sketch.) Lieutenant Grover intimated in his brief letter that Lieutenant Saxton reported the route could not be traversed by wagons. This changed the aspect of affairs, and I determined to send Mr. Stanley to the Piegan camp with the interpreter, Hammell, and to return immediately with Mr. Culbertson to Fort Benton. I determined also to defer the examination of the Marias Pass to another season. There was not that harmony in Mr. Lander's party which I deemed indispensable to making the examination which I had intrusted to him. Accordingly I ordered him to return with me. Stanley continued on to the Piegan camp, and I started back on my way to Fort Benton. It made a long march for us, for to get a good camp it was necessary to reach the Marias. Our Indian guide, however, made his way pretty directly to the camp; one hour and a half we travelled in the dark. The descent to the river was somewhat steep and difficult. We succeeded in getting into a good camp about 8 o'clock, when we all came together.

It may be remarked that, before starting on my return, I despatched an express to Donelson to push on with his advanced party, but to keep the track of the main train till my arrival. My purpose being, in the event the information brought by Saxton was different from what I expected, to leave the wagons behind and go on with packs, and I wished the train in a position to make the change with ease and despatch.

September 12, 1853.—Started early and pushing rapidly reached Fort Benton about 3 o'clock. Here I learned that, on the arrival of my express this morning, Lieutenant Donelson, who had delayed moving since the 10th, had sent forward a small advance party, and remained in camp himself with the main train, in conformity with my instructions. Lieutenant Saxton arrived at Vancouver June 27, having been delayed at San Francisco since the first of that month, procuring supplies and assistants. On July 2, Lieutenant Arnold, who had volunteered to accompany the expedition, left Vancouver with most of the stores destined for the depot in the Bitter Root valley, with twenty-one men as packers, &c. On account of the high water in the Columbia, he had much difficulty in passing the Cascades, and although everything had to be carried around them on the men's backs, he succeeded, after a week's hard labor, in landing them at the Dalles. Five days after Lieutenant Saxton also reached there, having completed his

arrangements and brought an escort of eighteen soldiers, under Lieutenant Macfeely, 4th infantry. His party now consisted of himself, Lieutenant Arnold, 3d artillery, Lieutenant Macfeely, Mr. D. L. Arnold, Mr. D. S. Hoyt, eighteen soldiers, twenty-three packers, three herders, two cooks, and one guide, in all fifty-two; having everything completed, he started from the Dalles July 18, but from the necessity of breaking in wild animals only travelled nineteen miles in the first three days. After crossing Des Chutes river he entered the dry sandy plain, (where the thermometer rose as high as 106° in the shade,) pursuing the emigrant road parallel to the south side of the Columbia, and from seven to ten miles distant. At the Umatilla he was met by a deputation of Cayuse braves, sent by the chief to ascertain his object in passing through their country, they having been told that he was coming to make war upon them and take away their horses. He assured them that such was not his object; that he was sent by the great chief at Washington on a mission of peace to all the Indians, and invited their chief to his camp to smoke the pipe of peace. He did so, promised to be friendly, and said he was glad that their hearts were good. He started with a wagon, which, however, broke down on the third day, and another which he then bought of an emigrant broke down before reaching Walla-Walla. The excessive heat and laborious travelling, through sand hills for many miles, caused some animals to give out, and two were drowned in swimming the Walla-Walla river. On the 27th the party arrived at Fort Walla-Walla, 120 miles from the Dalles; finding there that the route direct to Bitter Root valley, by way of the Koos-koos-kia, was very difficult, he determined to adopt the more circuitous one by way of Pend d'Oreille lake.

He engaged Antoine Plante as guide, a half-breed, who lived with the Spokanes near the prairie intermediate between them and Cœur d'Alenes.

On July 30 they left Walla-Walla, going for twenty-five miles up the beautiful valley of that name; the chief of the Walla-Wallas, Pu-pu-mux-mux, sent a warrior to him from his camp, 45 miles distant, to ask when he wished to cross Snake river. The long march, without water for twenty-five miles, between the Walla-Walla river and the Snake, was made in the night, and arriving opposite the mouth of Peluse river, a branch of the Snake, he met a delegation of fifty Peluse and Nez Percés warriors, who came in full costume and with great formality to have a great war talk. After a smoke, the chief made inquiries as to his objects in going through their territory with so many horses and so much merchandise. Lieutenant Saxton explained that he had been sent by the President to meet the chief of the white men, who was on his way there from Fort Benton; and that he, himself, was going there to see the Blackfeet, and to advise peace; that he had presents for them from the President, and would also pay them well for any assistance given to the expedition. A young Indian made an eloquent speech to the others in reply, in which he said that his father was once chief of all this region; he had extended the hand of friendship to the first white man who was seen in the country, and that they must follow this example. They seemed satisfied with the presents, and were much astonished at the rapid shooting shown them with Sharpe's and Colt's rifles, which made a very favorable impression in regard to their means of defence.

On the 2d of August he crossed the Snake, the loads being ferried over in canoes; two of the animals were drowned while swimming across. The Indians carried everything over safely, and were well pleased with the presents made them in return, bringing him corn and potatoes, and promising to kill a fat ox for them when Governor Stevens should arrive. Although they said that a Spaniard had been along, a few days before, telling them that American soldiers were coming to cut them all off, he satisfied them of the peaceful nature of his journey.

Here his only mercurial barometer was broken, and he was obliged to depend on the aneroid for a profile of the remainder of the route. The country north of the Snake was much superior to that south of the Columbia; and, making long marches in a northwest direction, in three days and a half he reached the Spokane river, 85 miles in a direct line from the Snake, and about 90 as travelled. The last forty miles was through a beautiful, open pine forest, the trees of immense size, and interspersed with fine lakes and ponds. Here he met with the Spokanes, the most noble tribe he had yet seen, whose chief, Garry, spoke good English, having been educated by the Hudson Bay Company.

They also had been told that his object was to make war upon them, but were delighted to find friends, and came in great numbers to welcome his party. About thirty mounted warriors, in full costume, formed upon a high hill and sang a song of welcome, making the hills re-echo with their wild music; and, as the setting sun shone upon the band, the scene was strikingly grand and imposing. He left with them three disabled horses, to be taken care of until our return, and gave them a few presents, informing them that they were sent to them by the Great Father at Washington.

Here he met Mr. Owen, who, with his brother, had spent several years in the Bitter Root valley, trading and raising stock. They had abandoned the post from fear of the Blackfeet, but his arrival enabled them to return and re-establish it.

Proceeding, on August 7th, across the beautiful and extensive Cœur d'Aléne prairie, he re-entered the thick forest, the trees in many places being so close as scarcely to admit an animal with a pack between them, and where the animals, much annoyed by yellow wasps, dashed off through the woods and injured their packs.

On the 10th he reached the outlet of Pend d'Oreille lake, sixty miles from the Spokane, and finding an old batteau of the Hudson Bay Company, after repairing it, made use of it to carry his loads over the river, which was about 600 yards wide and very deep.

In crossing several horses were lost, and, to relieve the weaker ones, Lieutenant Arnold took the heaviest articles to the head of the lake in the batteau. Just above the lake he met a party of about a hundred Pend d'Oreille Indians, returning from a hunting excursion to the Missouri, all mounted on fine horses, and carrying the buffalo robes and meat to trade with more western tribes.

They were perfectly civil and seemed to feel proud, rich, and independent. From them he heard rumors of a large party of white men coming from the east, to make peace with the Blackfeet. He describes Pend d'Oreille lake as being a beautiful sheet of water among the mountains. Travelling along the northern shore he was obliged to climb some very steep hills, in order to avoid the water. The whole region is covered with a dense forest of pine, cedar, and other forest trees, similar to New England. On the shore of the lake are many fine meadows, covered with luxuriant grass. At the upper end of the lake he found Lieutenant Arnold, with the boat, who had had a pleasant voyage up the lake, and spoke in the highest terms of the beauty of its scenery.

The next sixty-five miles, along the valley of Clark's Fork, is over a somewhat difficult trail, there being places where the sharp rocks injured the animals. The Cabinet, a high spur overhanging the river, clothed to its summit with a heavy forest growth, was crossed in this distance. The country generally was densely wooded, but much of the grass was burned. There is no difficulty, however, in getting sufficient grass for animals along this distance, except for one camp, where the grass is somewhat scanty. In such cases animals scatter very much, and

it is difficult to collect them in the morning. In consequence, however, of the mistake of his guide, as to camping places, Lieutenant Saxton was entirely without grass for two nights.

He then reached Thompson's Prairie, a fine tract of meadow land, hemmed in by the mountains, where the excellent grass makes it a favorite camping-ground for the Indians, and where the Hudson Bay Company formerly had a trading post, which was abandoned on account of the hostility of the Blackfeet. The forest here is open, and grass of good quality grows under the trees. Here, on August 21, the first rain fell since he left the Dalles.

During the next eight days he found excellent prairie camps, and crossing Clark's Fork on a raft, which delayed him for a day, reached St. Mary's village, in the Bitter Root valley, on August 28, where he had the disappointment of learning that the eastern division had not been heard from. On the way tracks of Blackfeet were seen, and the guide, Antoine, felt satisfied that they were watching an opportunity to steal horses. The officers kept strict guard, and, though an alarm was given one night, no trouble was encountered. The lateness of the season and the great losses sustained in transporting the provisions made it necessary to send back from here every man who could be spared, so as to save for the eastern division as much of the stores as possible. Lieutenant Macfeely, though anxious to accompany him to Fort Benton, yet, with a generous devotion to the interests of the survey, consented to take charge of the returning party, and conduct them by the southern Nez Percés route across the Bitter Root mountains near the Koos-koos-kia river.

St. Mary's, or Flathead village, was laid out by the Jesuit missionaries, who introduced much instruction in agriculture and other arts of civilized life. They, however, deserted it before completion, and it was finished by the present occupant, Mr. Owen. The Flatheads have a considerable village of log-houses around Fort Owen, and own a large number of cattle, raising also wheat, potatoes, poultry, &c.

Lieutenant Arnold, with his brother and four men, were left in charge of the depot and animals, with directions to complete his observations for latitude and longitude.

Lieutenant Macfeely, with nineteen men and twenty-three days' provision, were to return to Fort Vancouver by the route mentioned, considered shorter but more mountainous than that traversed in coming eastward. Lieutenant Saxton, with seventeen men and the guide, who thought it unsafe to cross the mountains with a smaller party, left the village September 2, on his way to Fort Benton. He says of the country along the Blackfeet Fork, after passing Hell Gate: "I think it decidedly a misnomer to call this beautiful region by so unholy a name. The sun does not shine on a better spot on earth, and I found that my previous ideas of the Rocky mountain range were, as far as this section is concerned, entirely erroneous."

"Instead of a vast pile of rocks and mountains almost impassable, I found a fine country, well watered by streams of clear, cold water, and interspersed with meadows covered with the most luxuriant grass."

Passing through a region of similarly fine character, on September 7 he crossed the dividing ridge, which he describes as a high hill. The distance in a straight line between the waters of the Columbia and the Missouri, at this place, is not more than a mile.

Nature seemed to have intended it for the great highway across the continent, and it appeared to offer but little obstruction to the passage of a railroad, though from having only an aneroid barometer he could not ascertain its exact altitude. Game abounded on the western slopes of the mountains, but was less abundant eastward.

The next day, September 8, he was agreeably surprised by the arrival in his camp of Lieu-

tenant Grover and his party of nine men, on their way to St. Mary's village, bringing the intelligence of my safe arrival at Fort Benton. He felt rejoiced that the plan of our operations had been successful and the object of the expedition accomplished; as a party from the Atlantic and one from the Pacific—each in search of the other—had met by appointment, after traversing thousands of miles of unknown country, at the foot of the dividing ridge between the oceans.

Returning together, they reached Fort Benton on the 12th. We were all greatly rejoiced at the arrival of Lieutenant Saxton with information of the country between us and the waters of the Columbia.

MR. TINKHAM'S TRIP.

Mr. Tinkham reached camp about eight o'clock this evening, accompanied by one of his men, leaving his party to come in in the morning. The following are the incidents of his trip:

Going up the valley of Milk river on the third and fourth of September, for fifty miles above the Bear's Paw mountain, Mr. Tinkham found it bordered by the same kind of bluffs as further down; steep, irregular broken slopes of clay and sand, destitute of all vegetation, with sandstone out-cropping in layers or blocks; the cottonwood growth, growing gradually thinner, ceased altogether in the distance of twenty miles, and for thirty miles further perhaps not a single tree is to be found on the river banks. The bed of the river, more dry than lower down, is five or six hundred feet wide, and but a few feet in depth. Water is rarely found, and then only in some hole sheltered by the overhanging bank. All these things, with the almost total absence of animal life, the whistling, drifting sand of the dry river bed, gave to this portion of Milk river valley, in the chilliness of autumn, the character of desolation and dreariness. No point was found so favorable for leaving it as the one at which the main train turned southward by the valley of Elder creek. At Mr. Tinkham's last camp on the river, its character was a little improved by the reappearance of cottonwood trees, luxuriant grass, and sufficient water in holes. He also noticed detached fragments of lignite in some abundance, which may become of value for fuel.

About twenty-five miles further up Mr. Stanley crossed this river September 12, and found it there studded with cottonwood groves and undergrowth, and twelve miles further north he crossed a branch of it, then dry, which was said to be the outlet of Lake Pakokee, or Bad Water, which was eighteen miles long and five broad. Another dry river bed was lined by scattering cottonwood, elm, wild cherry, and hawthorn. Passing from Milk river valley across the south prairie for twenty-eight miles southwest, on the evening of the 5th he reached the first of the Three Buttes, and the next morning ascended the two highest and most easterly, which occupied him until afternoon, making the latter part of it on foot. By the barometer, their height was found to be about 3,300 feet, or about 6,700 feet above the sea, and as he left their summits at sunset the thermometer had fallen to 37°, and was still falling. These peaks, standing completely isolated, have long served as watch-towers and landmarks to the roving tribes that range over the country for a thousand miles around. Assiniboines, Crows, and Blackfeet, have marked their summits with monumental heaps of stone, and retained their lodges, in which war parties have awaited the favorable moment to pounce down upon the unguarded wanderer in the plains below. They are about half covered with a small growth of pitch pine and spruce, from eight inches to two feet in diameter; the other half consists of grassed slopes, sometimes even extending to the higher peaks, which are covered with a thrifty

abundant growth, the favorite sustenance of numerous elk, antelopes, black-tailed deer, big-horn sheep, and hares, all of which were seen more numerous than in the lower country.

Wild cherries and gooseberries, strawberries, raspberries, and blackberries abounded. From the summit the view is highly illustrative of the surrounding country, embracing every prominent object within a hundred miles. On the north, about ninety miles distant, stands Cypress mountain* far above the 49th parallel; on the east and northeast interminable prairies; on the southeast the Bear's Paw range; on the south various detached ranges beyond the Missouri, and westward about ninety miles is seen the dividing ridge of the Rocky mountains, which forms the boundary of the prairie in that direction. The intervening regions present but few objects to arrest the eye; they are intersected by the various rivers and their branches, which are hidden, even with their edging of trees, in the deep valleys common to them all.

The interesting characteristics of these buttes apply equally to all the high ranges near the Missouri and Yellowstone as far as they have been explored. While southward they present insuperable obstacles to the direct passage of a railroad westward, thus making the valley of the Missouri indispensable as a route; they, at the same time, by their vicinity to its branches, form inexhaustible sources of supply of excellent timber, and ameliorate the climate around them by increasing the precipitation of rain, which supplies the numerous rivers of this still almost unknown country.

Near the Three Buttes both Mr. Stanley and Mr. Tinkham also found beds of lignite, or coal from three to six feet thick, and of large extent, promising another valuable material for fuel just where it is most needed, near the navigable waters of the Missouri.

On the morning of September 6, after a fall of rain at their bases, Mr. Tinkham found their peaks glittering with a pure white covering of snow, which stretched far down their slopes, and contrasted brilliantly with their dark masses of evergreen growth.

On the 7th, passing between the two peaks which constitute the third butte, he struck across the plains towards Marias river, and did not reach it until the evening of the next day, the distance being thirty miles, over dry rolling prairie, parched, and without water, except that which was standing in pools, left by the recent rain. Dry beds of streams were crossed at intervals, showing that at some seasons the rains must be abundant.

Marias river, (see sketch,) which he crossed about seventy miles from its mouth, there flows in a channel two or three hundred feet below the prairie level, and is tolerably well wooded. The water was at that time one hundred and fifty feet wide and two to four feet deep, slightly milky, with a swift current and pebbly bottom. The valley is frequently crossed by coulées. It resembles the Missouri in its character of interval and high, steep bluffs, where the main train crossed it at its mouth, and is reported by competent judges to be capable of improvement, so as to be navigable by light steamers for fifty miles.

About eight miles further, in the same direction, he reached the Trunk, a box-like elevation, not very high, but affording a good view of the Rocky mountains.

There he changed his course southeastward, toward Fort Benton, and reached it in a day and a half, the distance being about seventy-five miles by the circuitous route he followed. The country continued prairie, destitute of wood, and with little water except in the streams, which occurred at long intervals, most of the smaller ones being dried up.

Forty-two miles southeast of the Trunk is the Knee, another square, detached hill, about half a mile wide, and looking like a fortress, being accessible at only a few points. It is five miles

* A small short-leaved pine, (*P. Banksiana,*) is called cyprès by the voyageurs.—J. G. C.

Stanley, Del. Sarony, Major & Knapp Lith. 449 Broadway N.Y.

MARIAS RIVER.

from the Teton river, on which he encamped, September 10 and 11, to rest his animals, which were much fatigued by their long journey without good grass or water. At that point, thirty-five miles from its mouth, it is smaller than the Marias, where he had crossed that stream, being from sixty to a hundred feet wide, from one to three deep, but showing signs of eight feet rise during high water.

It continues much the same further down, and is everywhere fringed with cottonwood.

Near the Trunk his horse was accidentally killed by the discharge of a gun in the hands of Monroe, the guide, the ball entering just behind Mr. Tinkham's leg.

The reconnoissance thus made in ten days included a route of two hundred miles, and embraced the great plateau between the Milk and Marias rivers, for seventy-five miles west of the route of the main party, besides an examination of the Buttes, and of the Milk, Marias, and Teton rivers, for a great part of their course, enabling their course to be very accurately laid down. It showed, also, the route generally best adapted for a railroad, should it cross this plateau, instead of keeping to the valley.

September 13–21.—Having now had the advantage of a personal conference with Lieutenants Grover and Saxton, I became satisfied that to insure our reaching the settlements this fall it was necessary to travel more rapidly than was practicable with wagons; and for this reason, and not because I in the least doubted the practicability of taking a train through with comparatively little labor, I determined to move with pack animals. Lieutenant Saxton, from the time of my departure from Fort Benton, impressed me with the importance of not delaying, and he was fearful, knowing that much time would be required on the road to make the necessary examinations of the country, that we might encounter a snow-storm, which would give us serious difficulty, particularly as the snow might cover up the grass.

Accordingly, during these days, the necessary arrangements were made to push forward the whole party with pack animals. The public property was stored at Fort Benton, in the care of Mr. James Doty, whom I left in charge of the meteorological post at that point. Mr. Doty was also directed to make all the examinations that he possibly could of the country, and to inquire into all matters pertaining to the Indian tribes. A very important point that he was to impress upon the Blackfeet was the meeting the western Indians in council next year; and he was, under the general instructions of the commissioner, clothed with the powers of a special agent, in order to effect this purpose. I determined at Fort Benton to send Lieutenant Saxton down the Missouri, with his assistant, Mr. Hoyt, Sergeant Wilson of the engineer detachment, several discharged men, and all but three men of the dragoon detachment. Had our transportation been sufficient I should have despatched him through the country from the Missouri to the emigrant route, which had been described to me by the Indians as entirely practicable and of a fine character; and for this I had the written authority of the department, which empowered me, on reaching the Rocky mountains and making what surveys I could, to send parties not required for the westward journey home by new routes, still further to explore the geography and resources of the country.

I was exceedingly gratified at this time by the spirit of the men. Several men whom I was afraid had not strength to make the trip, and whom I had first ordered to accompany Lieutenant Saxton down the Missouri, were so anxious to go on that they brought me a certificate from the surgeon, Dr. Suckley, stating that, in his opinion, they were strong enough for the journey,

and accordingly I allowed them to go on. We had now been together some three months, and there was great confidence between the several members of the exploration.

Lieutenant Donelson finally got off on the 16th, and I remained behind in order to hold a council with the chiefs of the Blackfeet, whose arrival from the Cypress mountain was daily expected, and to make up my mail for the department and my friends at home. I will respectfully refer to the first volume of the Pacific Railroad Reports for my detailed account of operations up to Fort Benton, and my plans for prosecuting the survey. From the 16th to the 22d instant we were very much occupied in fitting out Lieutenant Saxton for his homeward trip; Lieutenant Grover for the survey of the Upper Missouri; in correspondence, and in our council with the Indians. Mr. Stanley returned on the 20th, leaving in camp on the Teton the delegations of Indian chiefs who had accompanied him from the Cypress mountain, and he gives the following account of his visit:

MR. STANLEY'S TRIP TO CYPRESS MOUNTAIN.

From the camp near Fort Benton Mr. Stanley proceeded on the 11th of September, with three voyageurs and an interpreter of the American Fur Company, guided by Little Dog, one of the chiefs of the Piegans. His course was a little west of north, gradually ascending to the base of the Three Buttes, a distance of thirty-five miles from Marias river. He found them as interesting and full of life as did Mr. Tinkham, the grass around them having all the freshness of spring, with great herds of game feeding on it.

The next day he reached Milk river, thirty miles from the Buttes, and about thirty to the northwest of where Mr. Tinkham had left it. The country in its vicinity was much broken by dry coulées, in one of which he found a stratum of coal or lignite, three feet thick, and running for a quarter of a mile. The valley of Milk river is a mile in breadth, studded with groves of cottonwood, &c.; and its high borders of table-land, broken by ravines, look like the buildings and streets of some old city. Here he found three lodges of Piegans belonging to Lame Bull's band, and learned from them that the Piegans had divided their camp. Lame Bull had some days before descended the river, expecting to meet the expedition at the crossing to Fort Benton. Low Horn, with the rest of the tribe, had gone to Cypress mountain. He explained the object of his visit, and made them presents of ammunition and tobacco, for which they were very grateful, giving him fresh and dried meat in return. On the 13th he proceeded towards Cypress mountain, ascending gradually to the summit of the table-land north of Milk river; crossed a high rolling dividing ridge for twelve miles, to the dry bed of a stream having a valley two miles wide. This is the outlet of the large salt lake called Pa-ko-kee, which is about eighteen miles long and five wide. From this he crossed another broken, rocky ridge, for nine miles, and ascending it, halted at an old Indian fort built of logs and sticks. Twelve miles further he encamped, making in all forty miles that day. On the 14th he proceeded twenty miles north, and there reaching the valley of Bow river, which runs at the base of Cypress mountain, he discovered a band of horses towards the west, which he reached eight miles further, and found them to belong to the Piegan band he was in search of, which consisted of ninety lodges, under their chief, Low Horn.

Little Dog conducted him to the chief's lodge, and immediately the principal chiefs and braves, to the number of sixty, collected in the council lodge to receive his message. After hearing his talk, the chief answered that "the whole camp would move the next morning to hold a council with the chief sent by their Great Father." The day was spent in feasting

Sarony Major & Knapp Lith.s 449 Broadway N.Y.

BLACKFEET INDIANS—THREE BUTTES

with the chiefs, all seeming anxious to extend their hospitality, and, as a delicacy, offering him a dish of buffalo's blood boiled with berries. The next morning the town crier announced the chief's intention to move camp, and the horses being immediately brought in, in less than one hour the whole encampment was drawn out in two parallel lines on the plain, forming a very picturesque scene. Their lodge poles being fastened as a sort of sled, with the small ends tied across the horses or dogs' backs, and the others dragging on the ground, their goods are packed on them, as well as the children and the infirm, while some of the women and children also ride on the horses' backs. From three to five hundred pounds are thus transported by each horse at the rate of twenty miles a day. The dogs each drag about forty pounds. Thus a thousand Indians accompanied him as far as Milk river, where the main party remained to hunt, and the thirty principal men, with their families, came with him to Fort Benton, by nearly the same track he had followed in going. In eleven days he had gone 160 miles and back, effected the business he was sent for, made a number of sketches of the country and the Indians, and collected a partial vocabulary. The accompanying sketch is a view of the Three Buttes and the Blackfeet Indians engaged in the hunt, taken by Mr. Stanley on his return from Fort Benton.

Cypress mountain thus appears to be in about latitude 50° 05′, longitude 111° 15′. Along its southern base flows Bow river, a branch of the Saskatchawan.

COUNCIL WITH THE BLACKFEET.

On the 21st instant we held our talk with the Blackfeet. The Piegans, Bloods, and Blackfeet were represented. About thirty chiefs, braves, and warriors were present. They were accompanied by their women and children, the whole party numbering about a hundred. Some principal chiefs of the Gros Ventres, who had accompanied me to attend the council, became impatient at the delay and went back. The council was held in a large room in the fort, appropriated for a council chamber. The interpreter was Hammell, an intelligent voyageur, who had been in the country many years. The interpreter, besides performing his duty of translating, always acts as the executive officer in charge of the Indians. He provides their quarters, attends to their wants, and is responsible for their safety and comfort. The principal chiefs were quartered in the council chamber, and the others had their lodges outside of the fort. On this occasion the chiefs and warriors were all richly caparisoned. Their dresses, of softly prepared skins of deer, elk, or antelope, were elegantly ornamented with bead-work. These are made by their women, and some must have occupied many months in making. The other articles of their costume were leggins made of buffalo skins, and moccasins, also embroidered, and a breech-cloth of blue cloth.

Their arms were the northwest guns and bows and arrows. On all solemn occasions when I met the Indians on my route they were arrayed with the utmost care. My duties in the field did not allow the same attention on my part, and the Indians sometimes complained of this, saying, "We dress up to receive you, and why do you not wear the dress of a chief?"

When the Indians, on the occasion above referred to, were assembled in the council chamber I addressed the Piegans, and first thanked them for their hospitality to Mr. Stanley. Pointing to Little Dog, one of their chiefs, I said: "You have shown your good will to us by going through difficult passes and over bad roads. You have promised to go with us further if we desire it. This shows your good faith, and I sincerely thank you for it. I myself have come a great distance, and have passed many tribes on my way to the great ocean of the west. I shall pass through many more tribes, with whom you have waged war for many years, and I

wish to carry a message of peace from you to them. Your Great Father has sent me to bear a message to you and all his other children. It is, that he wishes you to live at peace with each other and the whites. He desires that you should be under his protection, and partake equally with the Crows and Assiniboines of his bounty. Live in peace with all the neighboring Indians, protect all the whites passing through your country, and the Great Father will be your fast friend."

To this, Low Horn, the principal Piegan chief, replied in behalf of the Indians. He first spoke of the Indians west of the mountains, and said that many years ago they had formed a treaty of peace, and for a long time were on excellent terms with them, meeting each other and hunting together on the Missouri plains. He said that the prominent chiefs of all the bands had adhered to that treaty, and had done all they could to restrain their young men; but their young men were wild, and ambitious, in their turn, to be braves and chiefs. They wanted by some act to win the favor of their young women, and bring scalps and horses to show their prowess. He added: "The Blackfeet are generous and hospitable. They always forgive injuries. Some years since, after a Blackfoot had been killed by a Gros Ventre, several Gros Ventres fell into our hands. These Gros Ventres all expected to be put to death, but we fed them, treated them kindly, and gave them horses to carry them home."

I then interrupted him and said: "I know this to be true, for the Gros Ventres told me of it themselves. When they told me this, I said it was a reason why they should not go to war to avenge the insult from you of which they complain." I then said to them: "Why is it that you have two or three women to one man? Is it not because your young men go out on war parties, and thus the flower of your tribe is cut down? And you will go on diminishing every year until your tribes are extinct. Is it not better that your young men should have wives and children and that your numbers should increase? Won't your women prefer husbands to scalps and horses? The Gros Ventres desire to meet you in council and have the difficulties between you arranged. Will you meet them in council?" They answered, "We will." I continued: "What words shall I take to the Flatheads, the Nez Percés, and other tribes with whom you have difficulties on the buffalo plains?" They answered that they would meet them in council, and desired to live on terms of peace with them. I asked them if they would cease to send war parties into the Flathead country before the council was held. They said they could not speak for those of their tribes who were not present, but would promise for themselves, and carry my words to other members of their tribes.

In conclusion, I told them "that I had learned much of them from Mr. Culbertson, who had married one of their women. I go west to see the other tribes; but Mr. Culbertson, whom you know to be your friend, will go down the Missouri and tell the Great Father what you have promised. I leave with you Mr. Doty, who will mingle with your bands and get acquainted with your people. This young man's father, (Governor Doty,) who was a great chief, spent a long life among the Indians and always treated them with justice. You will be a friend to this young man, as his father was a friend to your people."

Before the breaking up of the council I distributed presents of the value of about six hundred dollars, with which they were greatly pleased.

While in the council, Low Horn, the principal chief and speaker, made all his replies without rising from his seat, and in a quiet conversational tone. After the council he assembled his braves and resumed the lofty bearing of a chief. He addressed them with great fervor and eloquence; commanded them henceforth to cease sending out war parties, and threatened them with severe punishment if they disobeyed.

Stanley Del

Sarony Major & Knapp Lith. 449 Broadway N.Y.

TETON VALLEY.

It will not be uninteresting here to state that Low Horn, the quiet and even meek spokesman at the council, and the trumpet-toned chief in the presence of his men, crossed the Missouri in 1855 with his whole band, moved up the Judith, and camped on the Muscle Shell—the first man who extended the hand of welcome and friendship to the western Indians as they crossed the mountains on their way to the council, showing, most conclusively, that faith can be put in Indians; for it must be recollected that two years intervened between my conference with the Indians at Fort Benton, in 1853, to their reassembling, in 1855, at the council appointed at that time. I will here remark that on the 18th of September a special council was had with various young men of the Blackfeet tribe, who had come from the south, where they had gone in search of horses, and were on their way to their northern homes; and in every case this idea of peace between the Blackfeet and their hereditary enemies, and between both and the white children of the Great Father, was received with the greatest delight and satisfaction.

DEPARTURE FROM FORT BENTON.

September 22.—This morning we bade adieu to Fort Benton, and separated from the portions of the expedition who were assigned to duty east of the mountains. Before sunrise we saw Lieutenant Saxton off in his keel-boat, drawing eighteen inches of water, accompanied by Mr. Culbertson, who was directed by me to report to the department at Washington, and to urge the importance of the Blackfoot council. Lieutenant Grover, on a smaller craft, commenced his minute examination of the Missouri. Mr. Doty, who had won very much upon me by his intelligence, his fidelity, his promptitude, and energy of character, parted from me with feelings of hope and pride at the idea that now a field was opening to him where he could be useful to his country and make a reputation for himself. I take this occasion, in parting from Mr. Doty at Fort Benton, to pay an humble tribute to his worth and services. He is now no more; but he was my friend and companion at the great council held in 1855, where he acted as secretary of the commission. Twice did he traverse the country with me from the Pacific to the Missouri. Unwearied, indefatigable, and able, his services were felt, not only in our Indian duties, but in developing the geographical resources of every portion of the country which he had an opportunity to observe.

As we left the fort, soon after sunrise, we felt that our short sojourn there had not only let us into the experiences and vicissitudes of life in a remote mountain post, surrounded by numerous Indians, and accessible to information from home but once or twice a year, but we felt also that we had made warm and fast friends of all the inhabitants of that region—voyageurs, Indians, and gentlemen of the Fur Company. And I ascribed it mainly to one reason, that they felt that beneficent results would flow from the expedition, and they saw that every man was thoroughly in earnest in furthering it.

In order to make a long march this day, the evening before I despatched my train to a point well up the Teton, some twelve miles from Fort Benton; and there Mr. Osgood and Mr. Stanley, who had remained behind with me at Fort Benton, and myself breakfasted with the rest of our party. The accompanying view gives some idea of the valley of the Teton. I will here remark that Dr. Suckley, who had started with Lieutenant Donelson in the main train, and who had left it on the second day in order to visit the falls, was not able to find their track, and consequently returned to Fort Benton. He, and Messrs. Evans and Kendall, who had assisted me in my correspondence, were the additional members of my party.

CHAPTER VI.

FORT BENTON TO BITTER ROOT RIVER.

THE PARTY LEAVES FORT BENTON.—TETON VALLEY.—ANTELOPES.—PRAIRIE LAKE.—SUN RIVER.—CLAIMS OF THE PEND D'OREILLES.—SUN RIVER VALLEY.—OLD BLACKFOOT CAMP.—BEAVER CREEK —GOOSE'S NECK IN VIEW.—FLATHEAD TRAIL —BLACKFOOT TRAIL.—DEARBORN RIVER.—DIVIDING RIDGE.—BEAUTIFUL SCENERY.—THE DIVIDE PRACTICABLE FOR WAGONS.—BLACKFOOT RIVER VALLEY —RICH GOLD MINE REPORTED BY THE INDIANS.—THE CAÑON —BLACK BEAR AND CUBS —HELL-GATE VALLEY.—TRAVELLER'S REST CREEK.—FORT OWEN —MR. LANDER KILLS A GRIZZLY BEAR.—TRAIN LEFT BY LIEUTENANT SAXTON.—ARRANGEMENTS TO MOVE.—LIEUTENANT DONELSON ARRIVES WITH THE MAIN PARTY.—LIEUTENANT MULLAN, WITH A FLATHEAD DELEGATION, ARRIVES.—HIS TRIP.—LEAVES FORT BENTON.—FORDS THE MISSOURI.—GIRDLE MOUNTAINS —ARROW AND JUDITH RIVERS.—PLATEAU BETWEEN GIRDLE AND JUDITH MOUNTAINS.—CROSSES MUSCLE SHELL.—FLATHEAD CAMP.—FRIENDLY RECEPTION.—UPPER WATERS OF THE MISSOURI.—DIVIDING RIDGE OF THE ROCKY MOUNTAINS.—LITTLE BLACKFOOT VALLEY —THE BLACKFOOT AND HELL-GATE RIVERS.—CONFERENCE BETWEEN GOVERNOR STEVENS AND FLATHEAD DELEGATION —LIEUTENANT DONELSON, WITH MAIN PARTY, FOLLOWS LIEUTENANT SAXTON'S ROUTE.—VISIT TO VICTOR'S CAMP —ARRIVAL OF MR. TINKHAM AND LIEUTENANT MULLAN.—MR. TINKHAM'S ACCOUNT.—CLARK'S FORT.—JOCKO RIVER VALLEY —MEETS LIEUTENANT DONELSON —FLATHEAD FORT.—MR. TINKHAM SENT AGAIN ACROSS THE MOUNTAINS.—INSTRUCTIONS DESPATCHED TO LIEUTENANT DONELSON AND MR. DOTY.—VICTOR, THE FLATHEAD CHIEF.—CHARACTER OF ROUTE FROM JOCKO TO BIG BLACKFOOT.

The whole party moved off at nine o'clock, continuing for some distance up the valley of the Teton, when we ascended a hill to the prairie, and in 21 miles reached a coulée, where there were springs of water sufficient for our animals. Large bands of antelopes were seen on the road. We struck the Prairie Lake at 5 p. m. The water of the lake is excellent, but there is no wood. Our guide, the voyageur Baptiste Champaign, took us to the nearest point of Sun river, hoping to get in before dark; but we did not reach camp till some time after. Over the route to-day the grass was uniformly good, and much of the land arable. There is a somewhat steep descent to the valley of Sun river. We found near our camp an excellent spring of water; and the water of the Sun river itself is exceedingly transparent and pure. I have travelled over this plateau between the Teton and Sun rivers on two other lines, and the view at almost any point of the plateau is exceedingly picturesque and suggestive. Whilst the eastern slope of the main chain from the Rocky mountains, so far as we were able to observe it in our day's journey, has but little wood, there are large quantities of timber on the chains and mountains south of the Missouri, in the Bear's Paw and on the Three Buttes. The various minor upheavals and swales of ground, which here and there dot the surface of the country, have connected with them some story of Indian war, wrong or suffering. This whole country was once occupied by the Snakes, and, in later times, by some of the tribes of the Flathead nation. It belongs now to the Blackfeet by conquest, as was stated in open council at Fort Benton, in 1855, by the Pend d'Oreille chief, Alexander, who claimed it as the land of his fathers.

September 23.—Moved up the valley of the Sun river, having made an early start this morning. The Sun has a wide open valley; grazing exceedingly good, and the soil excellent. One of our Indian guides now left us and returned to Fort Benton.

In 16 miles crossed Sun river, near the point where it had been crossed by Lieutenant Donelson, who had preceded us. We continued up in the direction of the pass between the Crown

Stanley Del.

Sarony Major & Knapp Lith. 449 Broadway N.Y.

APPROACH TO CADOTTE'S PASS

Butte and the Rattlers, prominent landmarks west of Sun river, and visible at a great distance.—(See sketch.) This is a favorite resort of deer, antelope, and bighorn. They were present to-day in very large numbers. All through this country the grass is exceedingly nutritious. This is shown by the resort of animals and their condition. Continuing on, we came in view of the Bird Tail rock, so called from its peculiar appearance. Immediately to the west, in a line near it, is another landmark, known as the Piegan's Tear. After making some forty miles, we found a camp a little off our route, in a most delightful valley, a spring of water gushing out near by, and the remains of an old camp of the Blackfeet at hand, furnishing us with fuel already prepared to our hands. On our way to camp our guide pointed out to us an excellent wagon road to the south of our trail.

DIVIDE OF THE ROCKY MOUNTAINS.

September 24.—Started as usual very early this morning, and in four miles came to Beaver creek, a very beautiful stream of water. This stream is now full of beaver, and is much obstructed by their dams. The country is somewhat more broken to-day than it was yesterday; timber comes in view on the tops of the mountains, and the scenery becomes more grand each mile we proceed. Three miles beyond Beaver creek, a high peak, called the Goose's Neck, comes in view to the south of us; at the southern foot of which equally as good a road is found, though some two days longer, as the one now being travelled by us. It is a branch of the present trail, and is usually pursued by the Flatheads on their way to buffalo. That trail is called the Flathead, and our own the Blackfoot trail.

We now crossed several mountain streams in the course of a few miles, and in sixteen miles we struck the Dearborn river. At noon, we moved forward to the dividing ridge, which was reached at 4 o'clock. To this point our road, from near the Dearborn, lay over sideling hills and through timber. As we ascended the divide a severe, pelting rain and hail-storm, accompanied with high wind, thunder and lightning, suddenly came upon us, and did not abate until we had reached the summit. The wind blew very violently, and the mist resulting from the storm prevented our getting a very clear view of the country before us. It was with great gratification that we now left the plains of the Missouri to enter upon the country watered by the Columbia; and it was the more especially gratifying to me as, looking to my future duties in the Territory, I felt that I could welcome to my future home and the scene of my future labors the gentlemen of my party, which I did very cordially and heartily. I will observe that the scenery throughout the day's march, up to the divide, has been picturesque in the extreme; and the latter portion of it, from the entrance proper to the pass, our road passed between hills on every side covered with timber, on the sides of which we are constantly travelling; while many feet below are to be seen the small upper tributaries of the Missouri, flowing from their source in a valley that is very wide for so small a channel, and lined with verdure and the foliage in yellow leaf. All this made a combination full of interest to the eye of one who could appreciate the beauties of nature.

The ascent from the eastern base on the Indian trail is somewhat steep, though, in 1855, I gained the summit by a large, wide, open ravine north of the Indian trail, by a very gradual ascent and without much increase of distance; I was a good deal surprised to find how small an obstacle this divide was to the movement of a wagon train. Had we gone on with our wagons there would not have been the slighest interruption, up to the entrance of the pass, to making the usual journeys each day.

In the pass, which may be considered some eight or nine miles long, there would have been some work, for many coulées run down into the tributaries of the Missouri, whose general valley we pursued, which would have to be bridged, or the banks on either side slightly dug away and improved; but even this amount of work, to parties experienced in encountering the difficulties of the prairies, would have been of trifling consequence. We were twenty minutes simply descending on the western side, which was somewhat more steep than the eastern. Continuing on, we followed the valley of the Blackfoot river some ten miles, and camped in good grass, with excellent water and abundance of wood. It may be generally remarked that, since leaving Sun river, no difficulty has occurred in finding excellent camps, with plenty of wood, water, and good grass. Shortly after getting into camp it commenced raining, and continued steadily all night; the weather being raw and cold.

September 25.—Raining hard this morning. The animals having strayed some distance, we were detained until 8 a. m. The first fourteen miles were through an open, wide and beautiful prairie, after which much of our way was through wood, where fallen timber offered serious impediments to our rapid progress. At times through the river bottom, the low brush and willow growing around us made it necessary to use our arms to open the brush in making our way through it.

At 1 o'clock Stanley and myself, having gone rapidly ahead, had a big fire built to receive our party as they came up. Here we lunched. By 3 o'clock the clouds were breaking away and the rain had ceased. Crossed several hills to-day, travelling on the sides of some of them. Just before we came out on the prairie on which we found Lieutenant Donelson and the main party encamped, we were three hundred feet above the level of the river. On the sides of the hill below us was growing the mountain pine; in the valley beneath, right at the base of this hill, was the clear, rapid stream; beyond was the foliage of the trees growing in the bottom. The tops looked like a green, rich carpet; further on were wide prairies, all bounded by a high ridge of beautiful hills, altogether forming a scene of surpassing beauty. At 5 p. m. we reached Lieutenant Donelson's camp, and found we had travelled about one hundred and forty-four miles since leaving Fort Benton.

LIEUTENANT DONELSON'S CAMP.

I conferred this evening with Lieutenant Donelson in regard to the continuation of the survey through the Bitter Root valley. He was exceedingly desirous to despatch Antoine Plante across the low divide lying between us and the Hell-Gate fork of the Bitter Root, to search for the gold mine which was known to exist on one of the tributaries of the latter river. It was well known to us that the Indians of that country reported very rich gold mines at different points; and our guide, Antoine, was of opinion that he would have no difficulty in finding the place. But it seemed to me, the season being late, that it would be better that this examination should be made by Lieutenant Mullan, who would have ampler opportunities and more time to do it thoroughly; and accordingly I directed Antoine to accompany me to the Bitter Root valley. Near our camp, the Blackfoot fork branches, the valley is very wide and open, and the country in view between us and the Hell-Gate is generally a rolling, well-grassed prairie.

Mr. Tinkham had been despatched by Lieutenant Donelson, on reaching the Sun river, to make an examination of its upper valley, and the country thence under the base of the mountains, to Cadotte's Pass, with a view of laying down a line of easy grades to the mountains.

In the execution of this duty he proceeded up the valley of the Sun river to its forks; thence continued on to the Dearborn; and thence made his way to the entrance of Cadotte's Pass. Although his provisions were giving out, and his party were on short allowance, he made a very thorough and satisfactory examination. As I approached the divide I found one of his camps, showing that he had preceded me but two days. It is a source of much regret to me that it was impracticable to delay the party to run a line of spirit levels over the difficult portions of the route in the neighborhood of the mountains, and over the pass itself. Some twenty miles down the valley I came across one of Mr. Lander's camps; and I learned, on joining Lieutenant Donelson, that he had not reported to him on his approach to the mountains, as was expected, but had probably preceded him to the Bitter Root valley.

BLACKFOOT VALLEY TO FORT OWEN.

September 26.—The gentlemen not required by my rapid trip to the westward—namely, Dr. Suckley, Mr. Evans, and Mr. Kendall—now joined the main party, and we pushed on over the Blackfoot prairie, (called in Lewis and Clark's Narrative the Prairie of the Knobs,) and after a march of thirty-odd miles came to a beautiful camp, near what is known in the country as the Cañon. To show the condition of the animals of the expedition, I will observe that, as I passed by the mules of the supply train, (for I remained somewhat late in camp this morning to confer with Lieutenant Donelson, the whole party being several miles on the march before I started,) I observed that their rate of travel, on a fast walk, was from four to four and a half miles per hour; and the advance of the train moved thirty miles that day, getting into camp early, the animals being apparently not fatigued. We had hardly made up our camp-fire, when, seeing a black bear and two cubs close by, we felt sure that we should have bear meat for supper; but, although all the voyageurs were on their track, they finally made their escape.

September 27.—We started about seven o'clock, and soon entered the Cañon—not, properly speaking, a cañon, for throughout its extent, until you reach the debouche of Hell-Gate, there is no special difficulty on the trail, nor would there be excessive work to open a good wagon road. But a good many sharp spurs come down close upon the river, throwing the trail well back, or involving a crossing of the stream to avail one's self of the prairies invariably found opposite each of these spurs. Much of the country was of a very excellent description, abounding in timber, well watered, and with soil of an excellent quality. A much better road would be found by leaving the trail of yesterday some ten miles before reaching our camp, crossing the Blackfoot river, keeping on its south bank and coming into the immediate valley of the Blackfoot, nearly two-thirds of the way down the cañon, and only six miles from the junction of the Blackfoot and Hell-Gate forks. Emerging from the cañon we come into a wide, open valley, commencing half a mile before reaching the mouth of the Blackfoot, continuing down the valley of the Hell-Gate until we enter the Hell-Gate ronde, a large, extensive tract of many miles in circuit, and where the Hell-Gate joins its waters to the Bitter Root. Crossing the Hell-Gate at a good ford, we continued up its valley and reached a most excellent camp on the west side of the Hell-Gate, some twenty miles from Fort Owen. We observed a trail passing over the side-hills east of the Bitter Root river, which is pursued in high water.

September 28.—Started at half-past seven o'clock. Keeping up the west bank of the Bitter Root river we crossed two streams—one being the Traveller's Rest creek of Lewis and Clark; and passing through a grove of pine timber, in $12\frac{1}{4}$ miles, crossed the Bitter Root river, just

before reaching which we met some Indians from Fort Owen. Lieutenant Arnold, whom we met after crossing the Bitter Root, on his way to Victor's camp, sent on a messenger to attend to his business with Victor and returned with us. We reached Fort Owen about noon, where we met the other gentlemen of Lieutenant Arnold's party. I found Mr. Lander in camp near Fort Owen, and learned that he arrived the day before yesterday.

MR. LANDER'S TRIP.

Mr. Lander, on receiving his instructions to report to Lieutenant Donelson for duty, in examining the approaches to the mountains, was directed by him to move at once, with his party encamped on the Marias, in execution of that duty. He ran a line from the Marias to the Teton, and thence to the Sun river, crossing it at the island some six miles below the forks. Between the Teton and the Sun river he killed the first grizzly bear, near a lake named, in consequence, Grizzly Bear lake. From the Sun river he continued his examination to the upper waters of the Dearborn, and thence immediately under the foot-hills of the Rocky mountains to Lewis and Clark's Pass; it being the pass pursued by Captain Lewis on his return trip. Mr. Lander, being provided with a suitable assistant and the necessary instruments, took some observations in order to determine the height of this pass, the grades of a railroad, and the amount of tunnelling required. Crossing the divide, he continued for seven miles down a stream which flows immediately from the pass, and for this distance has an almost straight course in the valley, with a remarkably uniform descent of a width seldom less than a quarter and opening to three-quarters of a mile. He then abandoned the examination of the pass furnished by this stream, and continued on the Indian trail over two low divides to a large tributary of the Blackfoot; passing four miles down which he came upon the Blackfoot fork. After continuing on for some distance down the valley he left it and passed over the divide to the waters of the Hell-Gate river: mistaking the Hell-Gate river for the Bitter Root, he moved up the valley of this stream, expecting to reach the St. Mary's village, when again he turned from it, and crossing over a series of divides and a number of streams, he entered the valley on a known Flathead trail immediately east of Fort Owen. In consequence of the route taken by Mr. Lander, and his animals having been much pushed, they came in exceedingly jaded, although he started with the best train of the whole party. He was unable to make any observations whatever bearing upon our railroad line, excepting for seven miles of the divide, a short distance thence down the Blackfoot valley, and a small portion of the Hell-Gate valley. All these facts did not come to my knowledge until a long time subsequently, and I deem it simply an act of justice to the expedition that they should be presented in this narrative.

FORT OWEN.

Fort Owen (see sketch) is situated on the Scattering creek of Lewis and Clark; and I would earnestly urge all persons desirous to know the minute details of the topography of this valley to study carefully the narrative of Lewis and Clark; for to us it was a matter of the greatest gratification, with their narrative in hand, to pass through this valley and realize the fidelity and the graphic character of their descriptions. Lieutenant Arnold had been jerking beef against our arrival, and making all arrangements to enable us, without delay, to push on westward. I examined very carefully into the condition of the train left by Lieutenant Saxton, and of the provisions brought to this point, and had every reason to congratulate myself for having assigned to him this undertaking. We found there nearly two thousand rations, but the animals were very few of them serviceable, yet, from their appearance, it was obvious

FORT OWEN — FLATHEAD VILLAGE

that none of them would continue unserviceable for any considerable length of time, and I believed they would be entirely equal to any service which Lieutenant Mullan's duties might require of them.

September 29 *to October* 3.—During these days we were all occupied in making arrangements for the movement of the parties westward, and to establish Lieutenant Mullan's winter post. Lieutenant Donelson arrived on the 29th with the main party, and Lieutenant Mullan on the 30th with a delegation of chiefs from the Flathead nation.

LIEUTENANT MULLAN'S TRIP TO THE FLATHEAD CAMP AND THENCE TO FORT OWEN.

Lieutenant Mullan, leaving camp near Fort Benton on the 9th of September, forded the Missouri five hundred yards below the fort, where the water was two and a half feet deep, took a southerly course to the foot of the Belt or Girdle mountains, which he reached after going twenty-two miles. Part of the route was along a small, shallow, and winding stream called Shonkee creek; which, however, showed signs of being sometimes thirty feet in depth. Grass was luxuriant in its valley, and at its head pines of large size were abundant. The first spurs of the range known as the Highwood are a thousand feet in height, and abundantly wooded.

The branches of Arrow river were next crossed near their heads in the mountain spurs, having beautiful valleys, wooded along the stream. On the 11th and 12th he crossed six branches of Judith river, and followed it to its head in the spur called the Judith mountains. These were also well wooded with pine, and of moderate elevation, and on crossing them the lofty snow-clad peak south of the Muscle Shell came into view.

Small tracts on some of the branches of Judith river had the desolate character of the Mauvaises Terres, particularly on Arrow river, where the ravines were perfectly awful to behold, descending to the depth of many hundreds of feet; the cliff black, barren, and destitute of timber, being composed of a mixture of sand and clay, the latter predominating. Granite and sandstone of excellent quality exist in the Girdle mountains, and a bed of salt was seen near their bases.

The whole country was found to be beautiful; a level plateau between the Girdle and Judith mountains, traversed by the numerous branches of Judith river and covered with excellent and high grass. Innumerable herds of buffalo were feeding near the mountains, and the small ponds swarmed with geese and ducks. The climate he compares to that of Virginia in May, and frequent rains, chiefly at night, were beginning to renew the growing season and the verdure of the plains. Near the mountains the streams were always wooded with cottonwood and wild cherry. Cedar grew on the lower bluffs, and the mountains, from their bases upward, were clothed with pitch and yellow pines, attaining a height of seventy-five feet and a diameter of from one to two feet, besides a species of spruce.

Thirty miles from the Judith range he crossed the Muscle Shell on the morning of the 14th, the stream being fifty yards wide, and from two to five feet deep, with a very rapid current. It winds through a beautiful valley, ten miles wide, covered with excellent grass, and the drift wood showed that the river in high floods reached a width of one hundred and twenty yards. Not finding the Flathead camp, or any signs of their trail, he followed up the stream four miles, and found traces of their having gone down. He then traced them for nineteen miles down stream, and passed two deserted camps, when they were found to have crossed the river. After going several miles over a rocky ridge three hundred feet high he made camp, and next morning, taking only the Piegan guide, started in search of them, and, after getting about fifty miles south of the Muscle Shell, again met with a beautiful prairie country, dotted with lakes, but

without streams of running water for considerable distances; and eighty miles, by his estimate, from where he started in the morning, and about seventy miles south of the Muscle Shell, he found the encampment of Flatheads. Having been unsuccessful in procuring an interpreter to accompany him, he was without the means of communicating with them. Fortunately, however, one of the Flatheads could speak French, and he acting as interpreter, Lieutenant Mullan explained to them the object of his visit; that he had a message from their Father, who desired them to send some of their principal men west of the Rocky mountains to hold a council with him; and that the intention was to do them good by making a firm peace with the surrounding tribes, and by supplying them with the means of cultivating the land, &c.

They received him in a friendly manner, and astonished him by having prayers on his arrival, as well as in the morning and evening, the whole tribe being assembled in the chief's lodge. After hearing him, the chief told him that in the morning he would give him an answer. The next morning, after much persuasion, he consented to send four of his principal men, who accompanied Lieutenant Mullan to his camp, where they arrived next day. There were altogether 150 lodges, 50 of them Flatheads, the remainder Pend d'Oreilles, and though plainly showing the good influence of the missionary instruction, they still were complete Indians in their love of finery, and in the state of drudgery in which they kept their women.

Returning to the Muscle Shell from the Flathead camp, he followed it up to the head of its north branch, and, crossing the dividing ridge there, a grassy prairie, descended along the headwaters of Deep (Smith's) river to the Missouri. The country passed over here was more rugged, mountains rising one thousand feet above the streams; but they were always well wooded with large trees, among which the hemlock spruce appeared. Near the Missouri the mountains were formed of a dark blue slate, changing lower down into red and green slate, under which is a rugged cream-colored rock. Antelope were abundant, and fine trout, two feet long, were caught in Deep river. Here, almost at the sources of the Missouri, and above the Gate of the Mountains, the valley was eight miles wide, and a most beautiful, well-grassed prairie extending on each side of the route as far as the eye could reach. Far to the south lay a high mountain range, the most distant peaks snow-clad, and, in the bright sunshine, glistening like mountains of silver.

His Piegan guide deserted him at the Muscle Shell, but the Flatheads showed a perfect acquaintance with the route mentioned. The main stream of the Missouri was here rapid, clear, and tortuous, near two hundred yards wide, the channel being six or eight feet deep, shut in by mountains on the west and hills on the east, causing numerous rapids in its course. Cottonwood and willow are the only trees on its banks.

Crossing a rough but low ridge west of the Missouri, he again entered a large level prairie, which further up opens on the Missouri, and is said by hunters to have an excellent communication for wagons with Fort Benton along that river. This valley was eighteen miles wide, and, crossing it, he followed up Prickly Pear creek for ten miles, finding the road good but tortuous, and encamped at the foot of the dividing ridge of the Rocky mountains. In crossing the dividing ridge, on September 24, he went up a steep acclivity, about one thousand feet high above the bottom of the valley. This particular route was not practicable for wagons; though he was informed there is one which, skirting the prairie referred to, crosses the dividing ridge a few miles further to the north by a very easy and gradual ascent and descent, the only obstruction being the timber and the loose rocks and stones. At the western base of the mountains the valley of the Little Blackfoot Fork is, for some distance, from a mile

to a mile and a half wide, and covered with a rich growth of very nutritious grass. Its branches also flow through prairies, and the hills on each side are high, undulating prairie, their summits occasionally covered with timber. Towards its junction with Hell-Gate river the Little Blackfoot becomes twenty-five or thirty yards wide, and its valley continues wide and open. The Hell-Gate below this point is eighty yards wide and two feet deep, and above the mouth of the Little Blackfoot takes the name of the Deer Lodge creek from the prairie through which it flows. Rolling prairie continues along its valley nearly to its junction with the Big Blackfoot Fork at Hell-Gate defile, and the road is good the whole distance. From Hell-Gate to the Bitter Root valley he followed the route of the main expedition already described.

CONFERENCE WITH THE FLATHEAD INDIANS.

On the 30th of September and the 1st of October I had conferences with the Flathead delegation. The principal men of the delegation were Pacha, Finissiant, and Palassois, three Flathead chiefs, and Cohoxolockny, a Nez Percés. They were invited into a room, and took a smoke all around. I then told them of my having sent to their seven lodges, and of the Indians having, the evening before, returned with Antoine to have a talk with me. That the chief, Victor, had returned to-day in consequence of the illness of one of his children, but Adolph was still here with the remainder. I said that, since Lieutenant Mullan left Fort Benton, I had seen the Blackfeet, who solemnly promised to give up waging war and stealing horses. They would also endeavor to restrain their young men. I thought that in the future they would conduct themselves more peacefully. Palassois replied that, when the master came to their camp, the Pend d'Oreille's chief said to them, "Go to St. Mary's, see the Father, listen to what he has to say, and return and tell me." I then asked when they would return to their chief. To which they replied, to-morrow. I then told them I would tell them to-morrow what word they should carry to their chief. I had business which required my absence now; but in the morning I would see them, and wished to see Adolph and his party with them. They then received each a piece of tobacco, and had another smoke and talk among themselves. Finissiant and Palassois are relatives. They are old sages. Palassois is a great hunter. He has kept the party supplied with game. He goes, also, in advance of the party in the morning, and at noon awaits them with a string of trout. All are Christians, and never eat anything without offering up a blessing, and never rise without praying. Mohen is the name of the Flathead chief. Four old sages came in yesterday, also Adolph and three or four of his men. They were invited into the room this morning about 10 o'clock. I informed them that I had given a license to Mr. Owen to trade with them, as I understood that he and his brother had always acted honestly towards them; that if they had any complaint to make against him, now was the time to make it. I also said that I would leave Lieutenant Mullan here, who would see to their wants, and also that their rights were not invaded. I told them that their rights were the use of their own lands, and that the Great Father desired them to be at peace with themselves and the whites, and to remain so forever. The Great Father wishes you to raise more wheat and potatoes,, and to collect more meat and skins, that you may not suffer from want. He sends to you traders, so that you may not be compelled to go a great distance to procure blankets and such things. We will leave Lieutenant Mullan with ten or fifteen men to protect you from the Blackfeet; but they have promised not to disturb you, and I believe that they mean to abide by it. After telling them that I would see them again next spring, I wished to know if they had any questions to ask. After conferring among themselves, they replied that they had none. In answer to inquiries, they informed us that there were about twenty-five

lodges of Nez Percés in the Flathead camp, hunting buffalo, each lodge containing two men. That they have a good many more women than men, though probably not double as many—not so many as the Blackfeet, but a great many children.

Finissiant then complained about the Blackfeet waging war against them and stealing their horses, but now that I had come he thought that this would continue no longer. I told them that the Blackfeet had spoken of how good they were, receiving them in their camp after they had warred against them. That their young men were the cause of the difficulties, and they were not able to restrain them. Now, however, the Great Father's voice had been heard in the matter, and the Blackfeet had returned to their camp to tell their people so. Finissiant then said that whenever they made peace with the Blackfeet they always commenced war again by killing one of their number, for which they were obliged to take revenge. I then showed them two Piegans, with whom I said I was willing to trust myself anywhere. I said that I believed all their chiefs and principal men were good and honest, and that they will control their young men, if necessary. Finissiant said that when our young men do wrong we talk to them and they mind what we say. I then told them that the Blackfeet desired to meet them, and the Nez Percés, and the Spokanes, and the Snakes, and other neighboring tribes, in council next year at Fort Benton, to make an everlasting peace. That they should all unite to prevent any man killing another or stealing a horse.

Finissiant replied that a word from their chief would prevent any trouble being made by their young men. I then asked them if they would go to Fort Benton next year. Finissiant replied that this will be a fine country after peace is made.

I said that they might not be able to say now whether they would go to Fort Benton, but I desired to hear their opinion about it. The Blackfeet had confessed that they had acted wrong, and I wished all the Indian tribes to hear it and be witnesses. Finissiant said that they had met a party of Blackfeet while hunting, and that they told them that the whites had advised them to make peace, which they would be glad to do. They will all go to the Blackfeet next spring. I then said that I would send word to the Great Father about the peace between the Flatheads and Blackfeet. When I heard from the Great Father I would send word to Lieutenant Mullan, who would inform them when to go to Fort Benton. They replied that they were satisfied. That they sometimes went to Fort Benton to trade, and across the mountains to hunt. Now they could go oftener, as they do not fear the Blackfeet as they did before. I then said that I would send word, by the two Piegans, to the Blackfeet that the Flatheads would meet them next year. This would please the Blackfeet very much. They then asked me to arrange everything for them. I called Mr. Monroe before them and told them that he had lived near the Blackfeet nearly thirty years; that he married a Blackfoot woman of the Piegan tribe; that he would soon return to the Blackfeet and tell them what he had seen. Mr. Monroe then told the two Piegans that the Flatheads promised to meet their people next year to make an everlasting peace; that the Flatheads are full of joy, and that they must tell their people this when they return. Monroe, at my request, gave them an account of Stanley's trip to the Blackfoot camp and the kind treatment which they received from the tribe. I advised the Flatheads to remain until to-morrow, promising to furnish them with provisions and tobacco. The Flatheads inquired what should be done in case the Blackfeet came near their camp at night.

They were advised not to attack them unless it was evident that they intended to do mischief. Still they must not remain quiet, and see their men killed or horses stolen. It would be best

Stanley Del

Sarony Major & Knapp Lith. 449 Broadway N.Y.

VICTOR'S CAMP, - HELL GATE RONDE.

AWAITING THE RETURN OF MR. TINKHAM

to leave the matter in the hands of Lieutenant Mullan, who would act for them. However, it is not believed that the Blackfeet will come with any such intention.

It may not be necessary here to dwell more particularly upon the arrangements which I made with Lieutenant Mullan, as his contemplated field of duty has been explicitly referred to. But this gentleman had impressed me in the most favorable manner, by the way in which he had discharged his recent duty, with the great confidence which the Indians had in him, and I was satisfied that very important results would grow out of his labors. I determined to despatch Lieutenant Donelson in charge of the main party over the general route pursued by Lieutenant Saxton, and to assign Mr. Lander to duty with him, in order, by side examinations, as well as on the direct route, to collect all the data bearing on the question of railroad construction. Accordingly, on the 2d instant, Mr. Lander went down the valley in advance of Lieutenant Donelson, in order to make some examinations of Hell-Gate, and on the 3d, Lieutenant Donelson was under way with the main party. I left on the 4th, and overtook and camped with the main party in my old camp of the 27th and 28th of September. Continuing on, on the 5th we both moved down the valley, and encamped on the Bitter Root, some three or four miles below the mouth of Hell-Gate. Here I ascertained that Mr. Lander, instead of waiting for the arrival of Lieutenant Donelson, to receive the instructions which I had directed to be issued to him, to go down the Bitter Root to its mouth, and join the main party at the Horse Plain, had preceded him on the main trail, and must be somewhere near the divide between the Bitter Root and the Jocko. Accordingly, by my instructions, Lieutenant Donelson sent an order directing him to return to his present camp, in order to proceed on the duty which had been assigned to him. This same day I visited Victor at his camp on the Hell-Gate, (see sketch,) three miles above its junction with the Bitter Root, and in return was visited by him at our camp, where we had much interesting conversation in regard to the Indians, the character of the country and the passes, particularly in the winter. I determined to remain here until Mr. Tinkham returned, who had not yet been heard from.

GOVERNOR STEVENS AWAITS THE ARRIVAL OF MR. TINKHAM.

October 6.—Lieutenant Donelson moved off this morning on the route of the Jocko river and Clark's Fork. Mr. Lander, who had returned to my camp in compliance with instructions, moved down the Bitter Root river this afternoon. I sent up to Fort Owen for Lieutenant Mullan, and we remained in camp, passing the time, as patiently as we could, awaiting the arrival of Mr. Tinkham. Meanwhile a huge joint of beef was placed upon the spit, to be in readiness when the explorers should come in, and honest Sergeant Simpson undertook to act as cook. Bending over the fire, with huge drops of perspiration rolling from his glowing red face, a picture was presented, (see sketch,) which Mr. Stanley thought not unworthy a trial of his pencil, while Osgood jokingly told Simpson he was working then for "two dollars a day and roast beef." The meat was cooked in the nicest manner, and at five and a half o'clock we sat down to it, having as guests Mr. Tinkham and his party, the returned "lost sheep of the house of Israel," also Lieutenant Mullan, who arrived in season to join us in our meal. Mr. Tinkham gave me an account of the incidents of his trip. As anticipated, in consequence of his proceeding without a guide, he had had difficulty in keeping the proper trail, and finally found himself in a low valley, closely hemmed in by inaccessible mountains, and covered with a dense growth of wood, through which they were obliged for one day to cut their way with axes, making during the day but six miles. This valley led them to Clark's Fork, and thence they crossed the ridge and came into

the Jocko River valley. Arrived there, they became aware of their whereabouts, and, leaving camp early this morning, pursued the trail taken by Lieutenant Donelson's party, which they met in the defile near the summit of the dividing ridge. On his route Mr. Tinkham passed the Flathead fort, which is situated on one of the tributaries of Clark's Fork, a little distance to the north of Jocko river. It is at present unoccupied.

I now determined to send Mr. Tinkham across the mountains again, to explore the Marias Pass, on which my mind has been so long fixed as a practicable and direct pass, and to return to the Bitter Root valley by some route south of those already explored; thence by the southern Nez Percés trail, to examine another route over the Bitter Root to Walla-Walla. The animals wintering at Fort Owen and at Fort Benton would suffice to afford him an exchange; and as I was satisfied that in the course of this trip his conferences with Mr. Doty and Lieutenant Mullan would all lead to a better mutual knowledge of the country, I made the necessary arrangements at once, and sent an express to Lieutenant Donelson informing him of the fact, and directing him to make the necessary pauses on his route that Mr. Tinkham might overtake him, and to furnish him with provisions and some fresh animals; and I availed myself of the opportunity to advise Mr. Doty, by letter, of the arrangements, and to suggest to him that it might be well for him to return with Mr. Tinkham to the Bitter Root valley, in order to enlarge his own knowledge of the country, and conceive properly the deportment of the mountain region, so that, returning immediately, he would have an enlarged and just view of his field of duty. This, however, I left optional with Mr. Doty, whose plans and labors, acting under my general instructions, I could not altogether foresee.

It is extraordinary how easy of passage the mountains are in this latitude. A favorite time of the return of the Flathead Indians from the buffalo hunt is between Christmas and New-year; it is only in winters of unusual severity that they are unable to cross during any month. The Indians west of the Cœur d'Aléne mountains return from the hunt usually in March, leaving the buffalo grounds early in the month, and reaching their homes at its close. I dwelt upon this in conversation with Mr. Tinkham, and wished him to let it be thoroughly understood by Mr. Doty, that the latter might not fear being caught in the mountains or obliged to winter at St. Mary's.

We have to-day seen at our camp a good deal of Victor, the Flathead chief, celebrated in the book of De Smet. He appears to be simple-minded, but rather wanting in energy, which might, however, be developed in an emergency. I secured a Flathead guide to go with Mr. Tinkham through the Marias Pass, returning with him by the Flathead Pass. He was at first reluctant to go, but afterwards consented. In the course of the evening the Flathead Indian came to me to decline going, and one or two of the men wished to back out. On tracing the cause to its source, I found they had been alarmed by some remarks of Monroe, who told them he was afraid they would fall in with parties of Blackfeet young men.

I will here remark that the Indian agent, Lansdale, in 1856, went over the route from the Jocko to the Big Blackfoot, sought for by Mr. Tinkham in 1853. It is much used by the Upper Pend d'Oreille Indians in going to hunt buffalo east of the mountains. The following description will show the character of this route:

Leaving the Mission of St. Ignatius the trail leads up the main fork of the Jocko, which runs through an open grassy bottom interspersed with pine trees. After following this stream for six miles the trail passes up the east fork, which has an open valley for about a mile, when the country becomes thick with trees, and many fallen logs obstruct the passage; the hills rise

high on either hand. In about ten miles the valley becomes narrow and the path rough and difficult, going in many places along steep rocky hill-sides. In about five miles further are a chain of lakes which extend to the headwaters of Little Water river, a tributary of the Big Blackfoot. The trail keeps along the margin of these lakes, sometimes in water, and in high water cannot be used. Upon reaching the divide the country is more level, the mountains recede towards the east, and small streams come in from both sides, but principally from the east, and soon form quite a stream. The country is wooded with pine, and much fallen timber occurs. Some low, swampy places occur on the first lake of Little Water river, and at ten miles from the divide the trail crosses a large stream, not passable at high water, which is supposed to be the principal fork of Little Water river. After crossing this stream the trail crosses a low divide, then passes along two or three little lakes with no outlet, then through open pine woods and prairies to some creeks running in a westerly course to the Blackfoot fork, before reaching which the country opens into a large prairie; crossing a large stream coming in from the east, the trail passes on direct to the Blackfoot fork.

This route has plenty of wood, water, and grass, but is only fit to be passed over in dry weather, and could only be made practicable for wagons by a great outlay of labor; in wet weather or spring time it would be impassable.

CHAPTER VII.

BITTER ROOT RIVER TO FORT WALLA-WALLA.

Governor Stevens starts with a small party.—Meets Mr. Lander.—Party of Nez Percés.—Inexhaustible beds of limestone and marble.—Ascent to Dividing Ridge.—View from the highest point.—Description of Cœur d'Aléne or Stevens's Pass.—Cœur d'Aléne Mission.—Père Gazzoli and Père Ravalli.—Charles Huet and Maginn.—Burial of an Indian Chief.—Buildings and church of the Mission.—Management of Missionary Affairs.—Sketch of the Mission.—Ingenious method of deer hunting.—Governor Stevens's address to the Indians of the Mission.—Departure.—Wolf's Lodge.—The Spokanes at their devotions.—Talk held with them.—Cœur d'Aléne Prairie and Lake.—Trout Fishing.–Falls of Spokane river.—Spokane house.—Spokane Camp.—Garry's visit to Governor Stevens.—Starts for Colville.—Information of Macfeely's arrival at Walla-Walla.—Arrival at Colville.—Meets Captain McClellan.—Main facts of the Exploration of the Cascades.—Captain McClellan reaches Vancouver.—Procures pack-animals.—Preparations of Lieutenant Saxton's party.—Organization of the party.—Indian guides.—Adopts the trail of the Klikitat Pass.—Slow progress.—Scarcity of grass.—Cascade range.—Passes explored.—The Klikitat.—Valley of Cathla-poo-tle.—Delightful climate.—Depot Camp.—Lieutenant Hodges sent across to Fort Steilacoom.—Captain McClellan's party surveys the Na-chess Pass.—Lieut. Duncan explores the Upper Yakima.—Mr. Gibbs the Lower Yakima.—Klikitat Tribe.—Kamiakin in council with Captain McClellan.—Lieut. Hodges in distress.—Return of Lieut. Duncan and Mr. Gibbs.—Main body moves into the Yakima valley.—Captain McClellan examines the Passes of the head of the river.—Lieut. Duncan the neighboring country.—Gold discovered.—Lieut. Mowry returns from the Dalles.—Arrival of Lieutenant Hodges.—Further reduction of the force.—Lieut. Mowry's Explorations.—Fort Okinakane.—Fort Colville.—Mission under Père Louis.—Mr. McDonald.—Legends.—Programme.—Colville Settlements.—Camp Washington.—Spokane graves.—Never-Freezing-Water Lake.—Indian Legend.—Painted Rocks.—Crossing of the Peluse and Snake rivers.—Falls.—Indian Legend.—Walla-Walla Valley.—Hudson Bay Farm.—Mr. McBane.—Father Chirouse.—Pu-pu-mux-mux.

October 7.—This morning the instructions to Lieutenant Mullan and Mr. Tinkham were reduced to writing; and by Lieutenant Mullan I sent word to Dr. Suckley, enjoining particular caution in his arrangements for descending the Bitter Root river. At 8½ o'clock we were on the road, the party consisting of Mr. Stanley, the artist, Mr. Osgood, my disbursing agent, and four voyageurs, with Antoine Plante, the half-breed guide. Mr. Lander, who had preceded us, we overtook in twenty-seven miles; when, after a short pause, continuing on eight miles over a rolling, and, in a few slight points, difficult country, we came to a good camp on a small stream of water; wood and grass most excellent. The first twenty-seven miles of the march to-day was through a fine prairie, wooded during the latter portion of the route. Our guide informs us that we shall to-morrow meet Indians going to buffalo. I forbear giving the incidents of this day's route with very great detail, as they will appear in the journal of my trip of 1855. I will simply observe that the valley of the Bitter Root is generally a wide valley, with occasional spurs running sharp down to the banks of the stream, but having opposite to such spurs an open and practicable prairie on the other side of the river. On both sides many streams of clear and pure water are seen, and the country is extremely well wooded and well watered generally.

October 8.—We started at 7½ o'clock, passing over a hilly, wooded, and at times difficult

Stanley. Del.

Sarony, Major & Knapp, Lith. 449 Broadway, N.Y.

NEZ PERCES.

Stanley Del.

Sarony, Major & Knapp, Lith. 449 Broadway N.Y.

CROSSING THE BITTER ROOT

country, with several patches of prairie, one of which, two and a half miles long, and containing, probably, 1,000 acres, was covered with an excellent growth of grass, and at its western border was wooded. Here we met a band of about fifty Nez Percés Indians going to hunt. (see sketch.) They have from 250 to 300 horses, most of them splendid animals, in fine condition, and with perfectly sound backs. Women and children helped to compose the band, and babies of fifteen months old, packed in a sitting posture, rode along without fear, grasping the reins with their tiny hands. We met them in the entrance to a narrow place, a mile in length, leading along the water's edge; and wishing to have a talk with them, but unwilling to lose the time in returning to the open ground, I invited them to turn around to the first prairie, which Antoine assured me was not more than a mile or two beyond. The prairie we found to be well grassed, open and wooded. We now made our halt, and while preparing for the talk with the Indians a band of Cœur d'Alénes joined us. They, too, were on their way to the hunt, and numbered about sixty—men, women, and children—and had 200 horses and colts. We had a long talk. I told them about the steps taken to meet in council at Fort Benton; dwelt particularly upon the prospect of the Blackfeet making peace with all the Indian tribes; upon the promise they had given that their war parties should be stopped; and told them that at Fort Benton and St. Mary's I had left men who would interfere, unless these war parties ceased. This intelligence was most gratefully received. They tell me that they return from the hunt in March, going home by the Pend d'Oreille route. We parted with them at two o'clock, and at six made a good camp near the ford by which we mean to cross to the left bank of the Bitter Root river, upon whose northern bank we have been travelling. The road has been better this afternoon, not as hilly and more open. Two miles from camp we met two Pend d'Oreilles, who turned around with us. At the camp we found a mother and daughter, who had just crossed the river and pitched their lodge. They had eight pack and as many spare animals, and were on their way to join the Indians we met this morning. We gave all the Indians coffee, and the women in return gave us some cooked kamas root. It is of a dark color, small, between the pear and onion in shape, and of a sweet, agreeable flavor. The Pend d'Oreilles say that they have found four horses left by Lieutenant Saxton upon Horse plain, and promise to return them to Lieutenant Mullan. One of the Indians, an old man, knows the Bitter Root river well, but is not able to act as guide to Dr. Suckley. He thinks, however, that the father of one of his companions, also a good guide, will go; and he promises to get him and take him to the doctor. I wrote by them to Mullan and Suckley. During the night one of my best riding horses was strangled, his lariat being improperly tied around his neck.

October 9.—We started at 8 a. m., and crossed the ford.—(See sketch.) The ride of to-day has been rather tedious. We left the valley to get rid of the undergrowth of bushes, and took a trail over the side-hill, which carried us up and down hill successively, and in some instances through woods, occasionally obstructed by fallen timber. At noon we halted at a creek, where we found a single Indian family drying venison. For a little tobacco they gave us some fresh meat and trout, which we roasted before the fire, and which made us a substantial lunch; after which, pursuing our course, we fell upon a stream flowing from the dividing ridge, and continuing up it some six miles, made a camp, where we found an abundance of grass. Distance to-day nineteen miles.

October 10.—We continued in the valley about ten miles, the road leading through wood. Larch and spruce and inexhaustible supplies of limestone and marble were met with, and the latter we afterwards found in large quantities all through the mountains. At this point the

trail forks, one keeping to the right along the stream, and the other turning to the left and passing over a high overhanging mountain spur. Our guide, Antoine, informed us that the mountain trail was more easy for the animals, the one to the right being much obstructed by fallen timber. After commencing the descent we heard the voices of our men driving the animals in the valley beneath us, and waited till we turned them upon the trail we had concluded to take. We ascended the dividing ridge and reached a camp with good grass, upon a small lake, within a mile of its top. The lake, to which we were obliged to descend for water, is twelve hundred feet below the camp.

CŒUR D'ALÉNE OR STEVENS'S PASS.

October 11.—The pass beneath us was made by two rivers flowing from the dividing ridge in opposite directions, having their sources in lakes not more than half a mile apart; the general direction of the valley being east and west. We estimated our camp to be two thousand feet above the eastern base of the mountain, and two thousand five hundred feet above the western base. The lake upon the eastern side was about twelve hundred feet below us, and that upon the western side about seven hundred feet higher. This pass is probably practicable for a railroad and should be examined.* After pitching camp last evening a drizzling rain commenced falling, which we supposed would turn into snow before morning. Upon awakening this morning we were surprised to be greeted with one of the loveliest days imaginable. The sky was clear, and the air as soft and balmy as a morn in summer. After striking camp we ascended to the highest point of the ridge, about one mile and a half from camp. Here we made a long halt, enjoying the magnificent view spread open to us, which, I venture to say, can scarcely be surpassed in any country. Far distant in the east the peaks of the Rocky mountains loom up into view, stretched out to a great length, while the Flathead lake and the valley thence to the Blackfoot Pass was plainly visible. Nearly the entire range of the Cœur d'Aléne mountains, clothed with evergreen forests, with here and there an open summit covered with grass; numerous valleys intersecting the country for miles around; courses of many streams, marked by the ascending fog, all conduced to render the view fascinating in the greatest degree to the beholder. The mountains were covered with luxuriant coarse grass. Seated on this point, Mr. Stanley was enabled to transfer this beautiful panorama to his sketch-book. Descending the peak to the general level of the ridge, we continued on for nearly six miles, when the descent commenced, and in less than three miles we passed down a very steep descent and gained the base of the mountains, which we estimated rose three thousand five hundred feet above it. This brought us into a valley filled with gigantic cedars. The larch, spruce, and vine maple are found in to-day's march in large quantities, the latter giving a pleasing variety to the forest growth. About 4 o'clock we encamped upon the bank of the stream, which here grows much wider. We find the grass scanty, and therefore intend making an early start, and breakfast seven miles on the road. A Cœur d'Aléne accompanied us to this point from the eastern base of the dividing ridge, and at to-night's encampment we find a Cœur d'Aléne and his wife on their way to hunt.

October 12.—The scarcity of grass last night caused our animals to wander, and three of them were found at the base of the mountains six miles back. It was not until 10¾ o'clock that our men had them all collected, and we were prepared to move. We rode until half-past three,

* See pages 56 and 97, vol. 1, Pacific Railroad Reports, for my description and views as regards railroad practicability of the Cœur d'Aléne or Stevens's Pass.

CŒUR D' ALÊNE MISSION St IGNATIUS RIVER.

when we halted at a beautiful camp, although the day's march had been but twelve miles. Learning from Antoine that the Cœur d'Aléne Mission was only eleven miles beyond, I determined on going in to-night. Antoine and I accordingly mounted and rode to the mission in an hour and three-quarters.

CŒUR D'ALÉNE MISSION.

The Mission (see sketch) is beautifully located upon a hill overlooking extensive prairies stretching to the east and west toward the Cœur d'Aléne mountains and the Columbia river. About a hundred acres of the Eastern prairie adjoining the Mission are enclosed and under cultivation, furnishing employment to thirty or forty Indians—men, women, and children. I observed two ploughing, which they executed skillfully; others were sowing wheat, and others digging potatoes. Père Gazzoli received me with the most pleasing hospitality. Associated with him are Père Ravalli, now absent to procure supplies, and Brothers Charles Huet and Maginn. The latter, however, is a layman, attached to the Pend d'Oreille Mission, who is here at this time to assist in harvesting. Towards evening I witnessed the burial of an Indian chief. The funeral ceremonies were conducted after the Catholic form, and I was struck with the harmonious voices of the Indian choristers, and with their solemn observance of the ceremonies.

The Mission is composed of buildings enclosing a square. Some of them are quite old, but the barn is large and new. The church stands a little distance from the rest, and does much credit to those who erected it. It is constructed upon a plan designed by Père Ravalli, and is of the Roman demi style of architecture. Pulleys and ropes were the only mechanical aids in the construction. Père Ravalli is quite an architect, and drew up many designs before the one adopted was selected. In his room, which I was kindly given to occupy, was his library. I observed that it contained several standard works on architecture. The church was not completed, although sufficiently so for the performance of service within. The interior is prettily arranged. The altar is supported by two massive timbers of pine which are about four feet in diameter. We were informed that in erecting these pillars an Indian who was holding one of them became frightened and let it fall, fortunately without injury to any one. The priests live in a self-denying manner, and the good effects of their influence over the Indians around them are plainly manifest.

There is quite a village of Indians near the Mission. They have some half dozen log-houses, but most of them live in lodges.

October 13.—While awaiting the arrival of the train, I was enabled more particularly to observe the manner in which the affairs of the Mission were conducted. Brother Charles has charge of the buildings and attends to the indoor work, cooks, makes butter and cheese, issues provisions, and pays the Indians for their work, which payment is made in tickets bearing a certain value, "good for so many potatoes or so much wheat," &c. By this management the Indians are able to procure their subsistence in the summer by hunting and fishing, and have tickets in store for living during the winter. They are well contented, and I was pleased to observe habits of industry growing upon them. In the barn we saw their operations of threshing: four boys rode as many mules abreast around in a circle, being followed by two girls with flails, who appeared to be perfectly at home in their business. One-half of the barn is reserved for their crops, while the other is arranged for cattle. Their stock at present consists of twenty cows, eight pairs of oxen, and ninety pigs, which are driven to pasture upon the prairie by Indian boys daily. I noticed an Indian woman milking, and was surprised to see her use both

hands, something rarely seen amongst the Indians. We afterwards visited the field—a large fire was burning and around it sat Indians roasting and eating potatoes. There appeared to be a great scarcity of proper implements, and in digging potatoes I noticed that many had nothing better than sharpened sticks.

The train arrived about one o'clock, and Père Gazzoli allowed us to turn our animals into the enclosure.

I will remark that Brother Maginn declares himself to be, like many other naturalized citizens, a good democrat; inquired who was President, and appeared much pleased to learn that he was a democrat.

Mr. Stanley took a sketch of the Mission.

I have heard of an ingenious method of hunting deer which is practiced by the Indians and is worth while to relate. When the Cœur d'Alénes, Pend d'Oreilles, Spokanes, and Nez Percés meet together to fish and hunt, they form a large circle, and upon the trees around its circumference attach pieces of cloth made to resemble the human figure as much as possible. Then the hunters enter the area and start up the deer. Each cloth having the effect of a man, the deer being afraid to pass them are kept within the circle and easily killed. Last year the Pend d'Oreilles killed 800 in one hunt; the Cœur d'Alénes more than 400. It is said that the Cœur d'Alénes on the St. Joseph river have finer lands and larger prairies than those of this Mission.

October 14.—A Nez Percéz, Frank, who, with two men, arrived yesterday from Walla-Walla in three days, (and probably three nights,) and who stopped here to exchange horses for flour, says that fifty wagons have crossed the military road from Walla-Walla to Nisqually. The distance for pack animals from here to Walla-Walla is six days, to Colville four days, and four days to the Pend d'Oreilles Mission. For the provisions we have purchased of the père he takes whatever we chose to give. I leave with him a letter to Mullan to be forwarded, with the request that he will accompany it by one from himself. When the Indians returned from the field I addressed them as follows:

"I am glad to see you and find that you are under such good direction. I have come four times as far as you go to hunt buffalo, and have come with directions from the Great Father to see you, to talk to you, and to do all I can for your welfare. I see cultivated fields, a church, houses, cattle, and the fruits of the earth, the work of your own hands. The Great Father will be delighted to hear this, and will certainly assist you. Go on, and every family will have a house and a patch of ground, and every one will be well clothed. I have had talks with the Blackfeet, who promise to make peace with all the Indian tribes. Listen to the good father and to the good brothers who labor for your good." In the evening I had a long conversation with the père and the brothers.

October 15.—We started at 8 o'clock, after having given Brother Charles as many lariats for raising the timbers of the church as we could spare, and made $18\frac{1}{4}$ miles, meeting on the way some forty Indians—Cœur d'Alénes, Nez Percés, and Spokanes—on their way to buffalo. We camped to-day in a beautiful prairie, called the Wolf's Lodge, with good grass. Here we found nearly 100 Spokanes, with some 300 horses, on their way to the hunt. Among them there were only three Nez Percés. We gave them a little tobacco and some fresh pork. Towards sundown this evening I was greatly interested in observing our friends, the Spokanes, at their devotions. A bell rang, and the whole band gathered in and around a large lodge for evening prayers. There was something solemn and pathetic in the evening psalm resounding through the forests

FALLS OF THE SPOKANE

around us. This shows what good results can flow from the labor of devoted missionaries; for the Spokanes had had no religious instruction for the last five years. As I went down the river and met band after band of the Spokanes, I invariably found the same regard for religious services.

Afterwards they came around my camp fire and we had a talk. They tell me that six days since Governor Ogden and three gentlemen, with some soldiers, left Walla-Walla for Colville, to meet me. Garry, they say, is at his farm, four miles from the Spokane House. I spoke to them also in reference to their being on friendly terms with the Cœur d'Alénes.

The country through which we have passed to-day, though obstructed with fallen timber, and rolling, and at times broken in surface, was arable, and reminded me of a great deal of country that I have seen in New England, where there are now productive farms; and it was so with the wooded portion of the journey of October 16, lying between our camp and the Cœur d'Aléne prairie. The country intermediate between this and Clark's Fork, on the Pend d'Oreille lake, was described to me by the fathers and brothers at the Cœur d'Aléne Mission we had just left as also arable, well watered, and not much intersected by spurs or ridges.

October 16.—We started at 8 o'clock, our route being through an open wooded prairie. Soon after leaving camp the Cœur d'Aléne lake came in view to the south of us, and eleven miles from camp we struck it near its western extremity. It is a beautiful sheet of water, surrounded by picturesque hills mostly covered with wood. Its shape is irregular, unlike that given it upon the maps. Its waters are received from the Cœur d'Aléne river, which runs through it. Below the lake the river is not easily navigable, there being many rapids, and in numerous instances it widens greatly and runs sluggishly through a shallow channel. Above the lake, I am informed by the missionaries that it is navigable nearly to the Mission. Upon the eastern side appears a range of hills, along the eastern base of which I think the road from the Mission to Walla-Walla passes. Leaving the lake, we followed the river on its northern bank, passing a camp of Cœur d'Alénes, occupied with their trout fisheries. Here we witnessed a touching sight, a daughter administering to her dying father. Still keeping through open woods on a most excellent road, in two miles further we came to the Cœur d'Aléne prairie, a beautiful tract of land containing several hundred square miles. Trap rock, projecting above the surface of the ground, borders the river as we enter the prairie. Continuing on, we met a half-breed, Francis Finlay, on his way to the Bitter Root valley with his family, among whom we saw his pretty half-breed daughter. He lives near Colville, just beyond the ferry. They were well dressed, and had a very respectable appearance. After crossing the prairie a distance of some eighteen miles, we continued on and encamped at a spring with sparse grass. Had we gone two miles further we should have found an excellent camp on the river, and the next morning some of our animals were found in this very spot. Three miles before reaching camp we struck Saxton's trail, (edge of the prairie,) and near by we met some Spokanes, who said Garry was at his farm, and that he had caught some of the horses left by Saxton. The horses of the Spokanes roam over this prairie in herds of from 12 to 20. Towards the latter portion of the march the river runs over a rocky bed of trap.

FALLS OF THE SPOKANE.

October 17.—Leaving camp, Antoine, Osgood, Stanley and myself turned from the trail to visit the falls of the Cœur d'Aléne river, while Lavatte took the train ahead on the trail to the Spokane House. There are two principal falls, (see sketch)—one of 20 feet and the other of from 10 to 12 feet; in the latter, there being a perpendicular fall of seven or eight feet; for a

quarter of a mile the descent is rapid, over a rough bed of rocks, and in this distance we estimate a fall of 90 or 100 feet. One mile below this point we came to the ferry crossed by Saxton. Here there is a small Indian village, and the inhabitants were engaged in catching salmon. I noticed one large woman, who seemed to pride herself upon her person, which she took pains to set off in the most becoming manner, by means of a blanket wrapped around her. The road to the Spokane House was over a sandy prairie interspersed with groves of pine. Crossing a dividing ridge with high and steep banks we came into the prairie in which the Spokane House is situated, in which were two Spokane villages. We inquired for Garry, and I sent him a request that he would visit me at my camp. The train we found a mile below the junction, across the Spokane. The Indians indicating a good camp some distance beyond, we moved on, 8½ miles, to it, which we reached half an hour before sundown. Here there was good grass and plenty of water, and we soon made up a large camp fire. After arranging matters in camp, I observed about night-fall a fire down the river, and strolling down to the place came upon a little camp of Spokane Indians, and found them engaged in religious services, which I was glad of the opportunity to witness. There were three or four men, the same number of women, and a half a dozen children. Their exercises were 1, address; 2, Lord's Prayer; 3, Psalms; 4, Benediction, and were conducted with great solemnity. In the evening Garry visited us with some of the tribe. They gave rumors of a large party having arrived opposite Colville, also of a small party having gone from Walla-Walla to Colville. In the latter party was Jack, Macfeely's guide, and I learned with certainty that he had passed here two or three days before with two men, and that he reported that Macfeely's party had had a hard time and lost several animals. There is also a report of the arrival of a party at Walla-Walla from the mountains. I am also informed that an old man has just come from the Yakima valley in four days, bringing news of a party operating in that vicinity, towards Colville. I cannot learn whether the party is under charge of Captain McClellan or one of his officers. The Indians confirm the intelligence given by the Cayuse Indians at the Cœur d'Aléne Mission, that 30 wagons have crossed the Cascades by the military road, but rumors vary as to their success in getting through.

Garry was educated by the Hudson Bay Company at Red river, where he lived four years, with six other Indians from this vicinity, all of whom are now dead. He speaks English and French well, and we have had a long conversation this evening; but he is not frank, and I do not understand him. He has an extensive field, where he raises a large quantity of wheat. To-morrow he is going to Colville to get some of it ground. He remained in my camp more than two hours, finally leaving with a young man who promises to carry a letter to Donelson, informing him that there is a good trail from the Spokane House to the Yakima country, but saying that I could learn nothing definite of McClellan. Garry promises to send me to-morrow the Indian who has just arrived from the Yakima country, and who is posted up concerning the news at that place.

FORT COLVILLE.

October 18.—A Spokane breakfasted with us this morning, and we started at 8½ o'clock. After riding until ten o'clock we were joined by the old Indian referred to yesterday, and Antoine's services were immediately put into requisition to obtain information. At 12½ o'clock we lunched. The old man stated that a large party reached the bank of the river opposite Colville yesterday, and that they would cross to-day. I was satisfied from his accounts that the party was McClel-

lan's, and accordingly determined on going to Colville to-night. Antoine has horses half way. We rested until 2 o'clock and then set out, Antoine and myself pushing ahead of the train. We met Antoine's family encamped in a fine prairie, with whom Antoine remained, sending his brother-in-law on with us as a guide. At $4\frac{1}{4}$ we reached the ferry, where we were detained fifteen minutes. At $4\frac{3}{4}$ we meet Jack, who informed me that Macfeely reached Walla-Walla three weeks ago, being 22 days coming from St. Mary's. He lost twenty animals, and was detained two days in an unsuccessful search for a man who had strayed from the trail. The road was bad, and they got off the trail, having struck too high up. Jack told us that it was 28 miles to Colville, and that we could not reach there to-night, but being determined to do so we pushed on and reached Brown's at $5\frac{3}{4}$, who informed us that the distance to Colville was 18 miles. After partaking of some bread and milk, we resumed the road with the same animals, dashing off at full speed, going 8 or 9 miles an hour most of the way, and reached Colville at 9 o'clock. Mr. McDonald, the trader in charge, gave me a most hospitable reception, and addressed a note to McClellan, who had just gone to his camp near by, informing him of my arrival. McClellan came up immediately, and though I was fairly worn out with the severeness of the ride, we sat up till one o'clock. At 11 we sat down to a nice supper prepared by Mrs. McDonald, and regaled ourselves with steaks cooked in buffalo fat, giving them the flavor of buffalo meat. I retired exhausted with the fatigues of the day.

CAPTAIN McCLELLAN'S EXPLORATIONS.

October 19.—This morning I met Captain McClellan and the gentlemen of his party, and possessed myself of the main facts of the explorations made by them of the Cascades. The map had been well kept up by Mr. Duncan, the topographer; and all the gentlemen had seemed to co-operate most zealously with Captain McClellan in the discharge of their duties.

Captain McClellan reached Vancouver on the 27th of June; but finding much difficulty in procuring the proper pack animals, and other necessary outfit, he did not get his party in motion until July 18. The necessity of having Lieutenant Saxton's train off as soon as practicable, and the preparation of his party, delayed him, besides thus exhausting the supply of serviceable animals; and Indian horses, many of them of poor quality, had to be substituted for the mules, which, for service in such a country, should be of the best kind only.

The party, as finally organized, consisted of Captain McClellan, Lieutenant Duncan, 3d artillery, as astronomer, topographer, and draughtsman; Lieutenant Hodges, 4th infantry, quartermaster and commissary; Lieutenant S. Mowry, 3d artillery, meteorologist; Mr. Gibbs, geologist and ethnologist; Mr. J. F. Minter, assistant engineer; Dr. Cooper, surgeon and naturalist; Mr. Lewes, interpreter; five assistants carrying instruments, &c.; two sergeants, two corporals, and twenty-four privates as escort and workmen; twenty-two packers and three hunters and herders made the whole number sixty-six.

Guides were engaged among the Indians as they passed from one tribe to another, few knowing more than a very small area of country around them. The animals obtained were one hundred and seventy-three in number, of which only forty-six were mules, and one hundred of all were used for packing. The pack-saddles brought from San Francisco proved worthless, as well as those bought from the Hudson Bay Company; and about fifty old-pattern dragoon saddles, which happened to be at Vancouver, fortunately filled their place admirably, as far as they went. The almost unknown character of the country to be traversed, and the uncertain

disposition of the Indians, made it advisable to take a larger party than was afterwards found necessary.

The country east of the Cascade range being more open and traversable than that on the western slopes, it was considered best to reach there early and conduct the examination of the mountains by striking in with small parties whenever a practicable pass was met with. The unusually high stage of water in the Columbia made the usual trail eastward, on its banks, impracticable, and that of the Klikitat Pass, near Mounts St. Helen and Adams, was adopted.

This trail being but little used, and much obstructed by brush and fallen timber which required cutting, the party made slow progress at first, and reached the summit of the mountains on the 5th August, having made only seventy-eight and three quarter miles in twelve days' travelling. The route up the western slope was through a densely timbered country, some small prairies occurring at intervals in the valley of the Cathlapootle and its branches. These became fewer, and grass was scarce, as the train progressed, so that the animals suffered severely, while, from the flooded state of the valleys, or the ignorance of the guides, he was led over some very rough mountain spurs, among which one of the best mules got killed by rolling down a precipice. On the mountain summit excellent pasture was found, though timber of immense size still covered all but the highest peaks, up to an elevation of 4,500 feet more.

Three days' halt was made there to refresh the animals and to examine the country. As there seemed to be no practicable road pass in this portion of the mountains, Captain McClellan resolved to pass along their eastern slopes northward to Mount Rainier, where better passes were said to exist.

The first pass explored across the Cascade range was, therefore, the Klikitat. This ascends the west side by the valley of the Cathlapootle, which has numerous beautiful prairies on its lower portion, and presents no difficulty for twenty miles upward. But, on account of the uncommonly late continuance of the summer flood, Captain McClellan was obliged to take a different course to reach it, crossing several very rough and densely wooded spurs northeast of Vancouver, among which there are numerous small but rich and beautiful prairies, and good soil almost everywhere, even in the gigantic forest by which they are surrounded.

The Cathlapootle was struck about twenty-five miles from its mouth, where it runs between rugged broken hills, leaving sufficient valley for a wagon road for ten miles further, when for the remaining fifteen miles spurs coming in on each side to the river bank compel several crossings; when leaving the valley the trail led up a very steep mountain side to a rolling table land at its summit.

Except this steep ascent, which might, doubtless, be avoided by a different location of the route, there is no great obstacle to the construction of a wagon road up to this elevated region, where there is a great extent of beautiful and rich pasture land, and where even cultivation of some products might be successfully carried on.

Its general elevation is from 3,000 to 5,000 feet above the sea, and its delightful climate, in the middle of summer, alone offers much inducement for further exploration.

Besides the Cathlapootle, flowing west, there are the Washookat, Wind, White Salmon, and Klikitat rivers running from it towards the south, and emptying into the Columbia, fifteen or twenty miles from the line crossed over by the western division. These all offer avenues of approach, and probably have much fertile land in their course. No cold weather was experienced until at the highest camp, Cheguos, already alluded to, where, on the night of

August 8, ice formed to the thickness of about an eighth of an inch. Though, as usual in mountainous countries, the nights were cool, the heat, even on this elevated region, became oppressive by day. On August 11 he commenced the descent of the eastern slopes, and at once found the forests more open and traversable, consisting of yellow pine, with little undergrowth, and generally a grassy sward beneath. After five days' journey through this he entered the open central plains, then very dry and barren in appearance, the tops of the ridges near the mountains being rocky and almost destitute of vegetation. The small valleys on the branches of the Yakima showed, however, by the height of the grass, although as brown and dead as in winter, that they were capable of cultivation earlier in the year. Near the Atahuane Mission the priests and Indians raise very fine potatoes, besides melons and squashes.

On the Wenass he made a depot camp for two weeks, while parties were made up to explore the surrounding country. Deeming it necessary to have three months' provisions before starting to explore the unknown country northward, Lieutenant Hodges was sent across the Nachess Pass to Fort Steilacoom on August 22, with fifty pack-horses, six soldiers, seventeen packers, Mr. Lewes, and two men; the three latter to be left there. Many of the pack-horses having already given out, he was directed to exchange as many as possible for mules, and also to make a reconnoissance of the route.

On the 29th Captain McClellan himself, Mr. Minter, and six men started to make a survey of the Nachess Pass; the 24th, Lieutenant Duncan went with three men to explore the upper part of the Yakima, and on the 25th Mr. Gibbs, with two men, went to examine it down to its mouth.

The Indians hitherto met with had been peaceably disposed, although they had received false reports of the character of his party, and sent delegates to meet him on several occasions to inquire his objects. Large numbers of the mountain tribe of Klikitats were met with on the highest part of the route, engaged in their summer business of gathering berries. On descending to the plains many Yakimas were seen, whose chief, Kamiakan, held a council with Captain McClellan, and expressed the most friendly feelings, besides showing proofs of the sincerity of his professions by giving assistance. The favorable influence of the Catholic priests was here of great benefit to his party, and probably prevented trouble.

Captain McClellan returned from his examination of the Nachess Pass on the 29th of August, and describes the route as follows:

Going up the Nachess river, which is a large branch of the Yakima, at the distance of twelve miles from its junction with the Yakima, the character of its valley undergoes an entire change. The hills by this time become mountains, close in upon the streams, so that the valley from here to the head is reduced to a mere cañon, occasionally widening out for short distances. The stream winds with very sharp curves; the cañons are often, for a mile or two in length, occupied to their whole width by the stream. The walls of these cañons frequently rise vertically to the height of 400 feet, the mountains coming boldly down to their edges, the wall being of solid rock, generally trap or a compact igneous rock. The Indian trail is a very bad one, avoiding the valley and keeping to the mountain sides, where the ground is very strong, the ascent and descent long and steep, so much as that it would not be possible to construct a wagon road along the mountain sides at any reasonable expense.

The road would, therefore, be forced into the valley, and necessarily be located at times in the water, besides requiring an almost endless number of crossings.

The timber (yellow pine) commences in the valley, about eighteen miles from its mouth; for some distance it is open, and with the undergrowth only thick in places. The nearer the divide is approached the thicker the growth becomes, the underbrush and logs more troublesome, and the yellow pine gradually gives place to the white spruce, balsam, fir, &c., until near the summit it disappears. In all the openings of the valley the grass is good, and some fifteen miles east of the summit there is a chain of small marshy prairies, with excellent grass, while upon the mountains immediately south of the pass are some five or six prairies of larger size and similar nature, through which the trail passes.

The largest fork of the stream joins that up which the trail passes, about twenty-five miles from the summit, and heads directly in Mount Rainier—its valley is more difficult than that of the trail.

The elevation of the lowest point of the divide is 4,890 feet above Vancouver, and the ascent in the last seven miles of the valley is 229 feet per mile.

Proceeding westward the trail soon descends, by a very precipitous route, into the valley of Green river, follows that as far as its junction with the White river, together forming the S'kamish, and keeps to the S'kamish almost ten miles further. To the point where the trail leaves this valley the country passed over is all of the same nature. The descent for the first twenty miles is very abrupt, the valley very narrow, much like that of the Nachess, except that it is much more heavily timbered, the mountains approaching the stream so often that frequent crossings are necessary.

Portions of the S'kamish valley are very boggy; grass is almost entirely wanting for a distance of at least fifty miles from the summit. From the S'kamish to the Puyallup the country is a high plateau, much broken up by ridges and mountains. It is densely timbered with fir, but interspersed with prairies, the soil of some of which is good. It then enters upon the nearly level plateau bordering the sound.

On the 31st he received a note from Lieutenant Hodges, stating that in five days he had reached within twenty-five miles of Steilacoom, but that grass was very scarce, and his horses having been for three days in the dense forest without any, sixteen of them had given out; he had also learned that no mules could be procured, and that it would be impossible to obtain transportation for the provisions required. Captain McClellan at once determined to reduce the party to the minimum by sending in the escort and others, also directing Lieutenant Hodges to discharge some of his men. Lieutenant Mowry was, therefore, sent to the Dalles, with fifteen men to be discharged, then to return with two only, taking, also, everything that could be dispensed with. Lieutenant Duncan returned on the 31st from the Upper Yakima, having explored it to its source in the mountain lakes, and on the same day Mr. Gibbs returned from the mouth of the river. The observations made by them are embraced in the general description of those tracts derived from subsequent explorations. The safe journeys of these small parties showed that, fortunately, a reduction of the force could be made without danger.

On the third of September the main camp was moved to the Yakima valley, where another depot was made, while Captain McClellan, with Messrs. Gibbs, Minter, and six men went to examine the passes at the head of the river, and Lieutenant Duncan left in charge to examine as much as possible of the neighboring country.

Here the first traces of gold were discovered, and though not sufficiently abundant to pay for working, it caused considerable excitement in the camp. A large band of Indians, under

Ouhi, a brother of Kamiakan, encamped near, and were very friendly, their chief being the most good natured Indian yet seen in the country.

Excessively hot weather had prevailed all the way from Vancouver, except on the mountain summits, adding much to the hardships both of the men and animals, though at night the change was so great as to make the cold feel unpleasant. During the last week of August the heat at noon averaged ninety degrees, and rose once to one hundred degrees.

A week was spent in examining the mountains about the headwaters of this river, with the following results: The pass at the head of the main Yakima, some twenty miles north of the Nachess Pass, is but three thousand four hundred and sixty-six feet above Vancouver. On the lowest point of the summit is a shallow lake, about two hundred yards long, from which the water runs both ways. From this lake to the west the descent is exceedingly rapid. Towards the east the descent in the distance of about three-quarters of a mile is five hundred and thirty feet, to another lake, about half a mile long; from this to the large lake in which the river heads, a distance of about two miles in a direct line, the descent is five hundred and ninety-nine feet. From this last lake (Kitchelus) there is no difficulty in the way of the construction of a road of any kind, the valley of the river (Yakima) being generally wide and level, but covered in the upper part by a dense growth of timber. The largest of the lakes, the Kleallum is seven miles long and from one to three broad; they are all very deep, and are embosomed in and nearly surrounded by high mountains, being timbered with pine, fir, and white cedar. Captain McClellan examined this pass for only three miles west of the summit.

On September tenth Lieutenant Mowry returned from the Dalles, and on the sixteenth Lieutenant Hodges arrived from Steilacoom, bringing twenty-nine pack-horses loaded with provisions. He had been eleven days in returning, a much longer time than had been anticipated, otherwise a fuller examination of the mountains would have been made during his absence, though a better pass was still expected to be found further to the north.

A still further reduction of the force was now made, and three men, with thirty-two miserable broken-down horses, were sent to the Dalles, leaving only thirty-six persons in the party, with ninety-four animals. The provisions on hand were sufficient to last them for about seventy days.

From the various explorations in the vicinity and back to the Dalles, by Lieutenant Mowry, the following general description of the country on the eastern slope is compiled:

The country between the great bend of the Columbia and the Cascade mountains has the general character of the great plains, except that it is more undulating and even mountainous, a ridge of considerable elevation rising from the level of the Columbia, both north and south of the mouth of the Yakima, gradually towards the commencement of the wooded slopes, to from about four hundred to fifteen hundred feet above the sea. The lower part of the Yakima valley is less fit for cultivation than higher up, but contains much good grass land.

It is wide, open, and destitute of timber, except in the bottom lands, and even there few trees are found for forty miles up. Fifty-five miles up, on the branch called Atahnam, occurs the first oaks met with west of the Missouri river at Fort Union.

Upon the immediate banks of the river and its branches, where there is sufficient moisture in the soil, the land produces pretty well. The potatoes raised by the Indians are very fine; but melons and squashes, which they also raise, do not succeed well, perhaps on account of the seed being poor; and corn does not thrive at all.

The valleys of the various streams tributary to the Yakima vary from half a mile to three

miles in width, and are bordered with terraces, which decrease in productiveness with their elevation above the water, becoming more gravelly, and, finally, like the intermediate ridges, almost destitute of vegetation.

The average width of the main stream is five or six miles, becoming, at ninety miles up, reduced to one or two miles, and the extent of cultivable land is proportionately greater than on its branches.

The ridges between the different branches of the Yakima, and separating it from the Columbia north and south, are chiefly composed of basaltic rock, generally columnar, and more or less covered with gravelly and sandy detritus. On many parts of the highest ridges the basalt has been entirely denuded, leaving nothing but angular fragments of rock, and supporting no vegetation of any value. Wherever covered with earthy materials there is a good growth of grass, and probably the allied cereal grains might be produced, particularly the winter kind. Towards the base of the mountains the valleys, both of the main Yakima and of its branches, improve much in appearance and agricultural capacity. Yellow pine appears, and gradually increases in amount on the banks of the streams, and about ninety miles from its mouth begins to appear on the mountain slopes, marking with rather a sudden and sharp line the border of the unwooded plains.

Going southward from the Yakima to the Dalles in September, Lieutenant Mowry followed a trail leading through the outskirts of the pine forest and over the ridge south of the Yakima, where it is about fifteen hundred feet high. He met with three extensive and rich prairies, and several smaller ones, and many parts of the ridges were covered with good bunch grass. The poorest part of the whole is the descent of the high slope to the Columbia, opposite the Dalles, which is forty miles directly south of the most southerly branch of the Yakima.

On September 20th the march towards the north was resumed, and though the hills north of the Yakima valley had not appeared very high from a distance, the trail led over a portion of them higher even than the passes of the Cascade range. Here the mountains towards the north and west were to be seen for a great distance, nothing, apparently, but mountain piled upon mountain, rugged and impassable, and a large portion of their summits covered with perpetual snow.

Descending from this to the Columbia river, the mouth of the Pisquouse, the route led along its rugged western bank for four days, when, reaching Fort Okinakane, an old and ruinous establishment of the Hudson Bay Company, (see sketch,) where Mr. Lafleur, the person in charge, informed him of a foot-trail leading from the headwaters of Methow river to Puget Sound. From September 28 to October 4 was spent in exploring this route, the whole party going as far up the river as practicable with animals, and Captain McClellan making a further survey on foot, until the roughness of the trail and the barometer assured him of its unfitness for a railroad. The following is the description of the country traversed between the Yakima and Fort Okinakane: the range separating the Yakima from the Pisquouse, or Wenatshapam, rises to 5,749 feet above the sea, and along its summit the mountain forests extend further to the east than they do southward, ending a few miles east of where the trail crossed it.

The greater amount of vegetable matter, and the increased moisture of these elevated tracts, are causes of a superior soil in this forest.

From the summit of this ridge a view was obtained of the northwestern part of the Great Plain. It is thus described by Captain McClellan: "That portion of the Cascade range which crosses the Columbia sinks into an elevated plateau, which extends as far as the limit of

FORT [illegible]

vision to the eastward; this is the Spokane Plain. On it we could see no indication of water, not a single tree; and except on the mountain spur, not one spot of verdure. It was of a dead, yellowish hue, with large clouds of black, blending into the general tinge, and appeared to be a 'sage desert,' with a scanty growth of dry bunch-grass, and frequent out-croppings of basalt."

The character of the Columbia along the western border of this plain is thus described: "Through a valley of about a mile in breadth, in which not a tree is to be seen and seldom even a bush, and which is bordered by steep walls of trap, lava, and sandstone, often arranged in a succession of high plateaux, or steps, the deep blue water of the Columbia flows with a rapid, powerful current; it is the only life-like object in the desert."

"The character of the valley is much the same as far as Fort Okinakane. It occasionally widens out slightly, again it is narrowed by the mountains pressing in. Sometimes the trail passes over the lower bottom, at others elevated and extensive terraces, and in a few places over dangerous points of the mountains."

"In this portion of the valley a few small groves of pine are met with, but the general character is entire absence of trees and bushes. In places only is the grass good; but we found no difficulty in obtaining enough for the animals. The soil is so very sandy that it is not probable it can ever be applied to any useful purpose. Granite, gneiss, and syenite occur in the valley of excellent quality and in large quantities."

At the time of his visit, September, the Columbia was 371 yards wide just above the mouth of the Pisquouse, fifteen miles further up it was 329 yards wide; the surface velocity 3.6 miles, the mean velocity 2.9 miles per hour; a few miles further its velocity was nearly a mile per hour greater, these being taken where the strong current was near the shore.

The country along the Columbia between the mouth of the Pisquouse and the Yakima was not examined by any of the parties. According to Captain Wilkes, granite appears at one point underlying the basalt on the east bank, but neither rock appears opposite the mouth of the Yakima, where the banks are only about thirty feet high, and composed entirely of sand and boulders.

On the west side of the Columbia, around this great bend, the mountains rise almost immediately from the river bank, rugged and impassable, with forests at the height of about four hundred feet above the water, and perpetual snow on their summits towards the west. The Pisquouse, Enteatkwu, and Chelan, streams emptying on that side, have no valleys at their mouths, being three rough, rocky torrents. The Chelan flows from the lake of the same name, lying in a narrow valley 474 feet above the Columbia, and at its outlet over a mile wide. It is said to run back among the mountains for about thirty miles, and steep mountains close in on its shores within eight miles from the river, which was the portion visible.

Near its mouth and northward the country is much superior to the cañon of the Columbia, being composed alternately of gently rolling prairies and wooded hills, the open tracts being grassy and apparently fertile. There are probably other similar fine valleys among these mountains, which the vicinity of the navigable waters of the Columbia will render valuable in spite of the bad character of its own shores and the country east of it.

The Methow river, which was explored nearly to its sources, has a considerable extent of good agricultural and grazing land in its upper valley. Its lower part, for twenty miles up, is hemmed in by high wooded hills; above this, they become more rolling and grassy, and its banks are bordered by level wide terraces of better soil than those on the Yakima.

On October 5, the party proceeded northward from Fort Okinakane, along the river of that

name, and on the 9th reached a point in latitude 49° 26′, about thirteen miles south of the Great Lake. There is little difficulty in any part of this valley for road making; but, as it leads to no pass westward, further exploration was not necessary. The Hudson Bay trail to Fort Largley, on Fraser's river, leaves it about latitude 49° across a mountain ridge, to the west fork of the Okinakane, and another between that and Fraser's river. It is represented by all as barely practicable, and going directly across the mountains instead of through any pass.

The west fork, near the confluence, has no valley, running through an immense ravine impracticable for any road.

On October 12, leaving the Okinakane at the forks, they travelled eastward, crossing a high ridge to a small river flowing in the Columbia, opposite Fort Colville, where they arrived on the 18th, ferrying the baggage over in canoes and swimming the animals safely over. The country traversed since leaving Fort Okinakane is thus described:

The north bank of the Columbia, between the Methow and Okinakane, is low, sandy, and barren, but rises into grassy slopes at a few miles distance, which towards their summits become covered with pine woods. The forest evidently descends lower towards the north, and with the improving grass shows the influence of more abundant rains. After going about twelve miles up the Okinakane, the country gradually improves in appearance, pines and cotton-woods grow more abundantly, and there is evidently a large extent, both of the valley and rolling hills bordering it, capable of cultivation. At sixty miles, however, lofty wooded hills close in on its banks, and thence to the 49th parallel it presents little inducement for settlement, though capable of furnishing abundance of excellent timber.

There is a fine fall on the Okinakane, thirty-five miles above its mouth, of five feet pitch, and about twenty miles further up, on its west fork, four miles above the junction, another fall of ten feet, both supplying abundance of water power. On the top of the lofty table of the Great Plain, opposite the mouth of the Okinakane, is a considerable extent of pine woods, several thousand feet above the Columbia, into which it could be easily thrown or slid down, as the cliff is almost perpendicular. This is probably the highest point of the plain, and is the point where a spur appears to cross the river and to sink into the level of the plain.

The country between the Okinakane and the Columbia at Fort Colville, sixty miles in a direct line across, was traversed by Captain McClellan's party about fifty miles to the north of the Great Plain. Five miles from the Okinakane the Ne-hoi-al-pit-quu, flowing eastward, was reached, the dividing ridge being rolling and grassy, covered with forest at its summit, which is about 1,500 feet above the Okinakane, and 2,647 above the sea, as observed with an aneroid barometer.

The valley sloping towards the east, though narrow, is fertile, with alternation of prairies and forest, while the hills bordering it are wooded with large trees, mostly on their northern slopes.

The general character of the country is like that north of the Spokane, but more mountainous than east of the Columbia. At Fort Colville, the line of Captain McClellan's exploration connects with that of the eastern division.

In taking a general view of the route we find that the eastern slopes of the Cascade mountains are wooded with open forests from the elevation of about 2,000 feet up, nearly to the limit of perpetual snow. The trees are chiefly the large western yellow pine, which is the most abundant, and extends the lowest; north of the Yakima the western larch, of equal size,

becomes mixed with it, and finally more abundant in many places. Besides these, the scrub pine occurs in spots of sandy soil, and a few trees of other pines, supposed to be the red, and short-leaved or Bank's pine, (cypress of the voyageurs) occur northward. On the higher and more northern mountains there is also a small kind of white pine, and two or three kinds of spruce, small, and of little value comparatively.

Oak grows near the Dalles and along the skirt of the forest as far north as the Yakima. Cotton-wood and aspen usually line the streams, and the paper birch and a kind of cedar (juniper) grow near Fort Colville. The white cedar, or arbor-vitæ, so important west of the mountains, is not common on their eastern slope, though apparently more so on the western slope of the Bitter Root range. Among these forests of the eastern slopes there are found at intervals prairies, which are superior in character of soil to those near the Great Plain. Such is Tahk Plain, ten miles long, and from one to three wide, lying southeast of Mount Adams, and at the bank of Klikitat river, fifteen miles north of the Columbia, which has a lake in its centre, and is covered with luxuriant grass.

Among the pine forests there is almost everywhere a fine growth of grass, remaining green and fresh much later than on the lower plains and in the vallies. On the highest portion of the mountains extensive prairies are covered with the richest pasture when nearly all below is dried up, presenting the finest grazing tracts, even when too elevated for cultivation. Chequoss prairie, 4,000 feet above the sea, is one of this kind, and there are others of much less elevation in the passes at the head of the Yakima and its branches.

During our stay at Colville we visited McDonald's leap. Near it there is a Mission, under the charge of Père Louis, whom we visited. It is said that all through the valley of the Columbia there is trap rock veins of quartz. The Indians about the Mission are well disposed and religious. To-morrow Père Louis is to dine with us at McDonald's. As we returned to the fort Mr. Stanley was just going into camp, having made a march of 35 miles. The animals were put with McClellan's. In the evening we listened to the thrilling stories and exciting legends of McDonald, with which his memory seems to be well stored. He says intelligence had reached him, through the Blackfeet, of the coming of my party ; that the Blackfeet gave most singular accounts of everything connected with us. For instance, they say that our horses have claws like the grizzly bear ; they climbed up the steep rocks and held on by their claws ; that their necks were like the new moon ; and that their neighing was like the sound of distant thunder. McDonald has, of course, given a free translation of the reports made by the Indians. We listened to his accounts of his own thrilling adventures of his mountain life, and a description of an encounter with a party of Blackfeet is well worth relating. At the head of a party of three or four men he was met by a band of these Indians, who showed evidences of hostility. By signs he requested the chief of the Blackfeet to advance and meet him, both being unarmed. When the chief assented, and met him half way between the two parties, McDonald caught him by the hair of the head, and, holding him firmly, exacted from the remaining Indians promises to give up their arms, which they accordingly did and passed on peaceably. From Vancouver I wrote to him requesting him to give me, in writing, a store of legends, and to accompany them by notes upon the climate and nature of the country obtained by his own experience. He has lived here many years, and is an upright, intelligent, manly, and energetic man.

I now, after consultation with Captain McClellan, determined upon a continuation of operations, subject, however, to be modified by the condition of our animals on the arrival of Lieutenant

Donelson. It will be seen, that though a very fine examination had been made of the eastern slope of the Cascades, no line had been run by Captain McClellan to Puget Sound, and I deemed it of the greatest consequence to carry through such a line, so that we could speak with positiveness and certainty of the grades on the western sides, and the other facts bearing upon the question of railroad practicability. Captain McClellan was of opinion that it was possible to carry such a line through at this season of the year, although he apprehended that some difficulty might be found from the presence of snow.

I accordingly resolved to bring the whole party together at a camp south of the Spokane river, then to arrange parties so as to move to the Sound and the lower Columbia in such a way as would give the best additional knowledge of the country.

Garry this evening arrived at Colville with his wheat to be ground, and holds himself in readiness to take instructions to Lieutenant Donelson in regard to the place of meeting.

October 20.—I determined to remain here another day and to be prepared to go off to-morrow. We dined with McDonald, in company with Père Louis. In the evening I addressed the Indians, telling them of the interest government took in them, and that measures had been taken to secure peace between the Blackfeet and all the other Indian tribes. That government would do for them what it had done for the other Indians. During the day I inspected McClellan's animals and examined further into his work.

I was much gratified to learn that Duncan has kept his field-work plotted up from day to day. The whole party seems to be well organized. I am particularly well pleased with the labor of Mr. Gibbs in connexion with Indian affairs. He is a thoroughly educated man, and combines the habits of a student with the good qualities of woodsman and mountaineer, and has become very well acquainted with the Indian tribes through whose country the party has passed. And not only has he become acquainted with these Indians, but he has also interested the priests at the Missions in his work, and from them he has obtained much valuable assistance. Garry started with a letter to Donelson, appointing as a place of meeting a valley south of the Spokane river, some ten or twelve miles south of the Spokane House. This spot is only a short distance off the trail leading from Walker and Eel's Mission to Walla-Walla. From inquiries concerning Dr. Suckley's route I learned that the river between the Pend d'Oreilles Mission and Colville, sixty miles, is much obstructed by rapids, and that at this season of the year it is difficult, if not dangerous, for canoe navigation. I have, therefore, determined to send a letter to Dr. Suckley at the Pend d'Oreilles Mission, advising him not to take this portion of the trip by canoe without very carefully weighing the matter beforehand, suggesting to him to take horses at the Mission, with which he could be supplied by the priests. At Colville he is at liberty to take the land route with Lieutenant Arnold or to continue down the river in boats; or should Lieutenant Arnold take the river, they can, if they choose, descend together. I leave the whole matter to his own discretion, simply giving him information that he may not act unadvisedly or feel obliged to continue the trip by canoe to carry out the instructions received at St. Mary's. Lieutenant Arnold will ascend the Columbia to the 49th parallel, examining carefully near the mouth of the Clark's Fork, and ascertaining its latitude by astronomical observations. After conference again between McClellan and myself, the following programme was decided upon for our operations after meeting Donelson, subject to such modifications as may be found necessary by the condition of the animals and of the instruments in the main party. McClellan and Lander are to cross the Columbia above the mouth of the Yakima, and to carry a railroad line through the Snoqualmoo Pass to Puget Sound; Lieutenant Duncan to cross the

Stanley, Del.

Lith. of Sarony, Major & Knapp, 449 Broadway N.Y.

CHEMAKANE MISSION.

Columbia just above the junction of the Snake river and pursue the trail to Vancouver on the northern bank of the river; Lieutenant Hodges, with the remainder of McClellan's party, to go directly to Walla-Walla and thence down the Columbia. Lieutenant Donelson, with a select party, to go to the Cœur d'Aléne Mission, and thence take the trail to Walla-Walla, and the train to go to Walla-Walla under the direction of Dr. Hodges and Osgood.

THE PARTY LEAVE COLVILLE.

October 21.—The instructions referred to yesterday for Lieutenant Arnold and Dr. Suckley were left with Mr. McDonald. Supplies, particularly flour, were purchased for the prosecution of our future operations. We also purchased goods to pay the guides of Donelson and Tinkham; those for the latter to be sent to St. Mary's by Mr. Owens, should we meet him, as is most probable. We then moved off, McDonald presented us with a keg filled with cogniac to cheer the hearts of the members of all parties, and obliged us also to take a supply of port wine. We passed his grist mill on Mill river, the only one in the neighborhood.—(See sketch.) A march of twelve miles brought us into camp, McDonald accompanying us. We had a glorious supper of smoking steaks and hot cakes, and the stories added to the relish with which it was eaten. McDonald again charmed us with a recital of his thrilling adventures, and expressed much regret that the expected arrival of the Hudson Bay express from Canada obliged him to return the next morning.

October 22.—We got off early, and at Brown's we stopped to purchase horses, and succeeded in obtaining two, one for McClellan and the other for myself. McDonald accompanied me some distance further, when, bidding each other adieu, I pushed ahead, and reaching a small stream I found that McClellan's party had taken the left bank, and that the captain, who came up afterward's with Mr. Stanley, had gone on to join them. We took the right, and thus avoided a bad crossing in which McClellan's party became involved. We encamped upon the borders of the stream. Our train is now larger and more heavily ladened than heretofore, in consequence of the increased supplies. To-day we have thirteen packs. At night we killed a cow, purchased of Brown, and we still have an ox in reserve, to be killed when we meet Donelson. The air is cool and fresh, and our appetites keen. I may say here that two pounds of beef and half pound of flour per man is not too much for a day's allowance.

October 23.—Snow is falling this morning, and it has cleaned our beef admirably. I received a note from McClellan just after setting out saying that in consequence of yesterday's difficulty with the train he thought that he had better remain with his own train. He afterwards, at my request, joined me, leaving the train under the charge of Duncan. We journeyed but ten miles, encamping near where we had seen Antoine's family in going to Colville. The snow ceased falling about noon, with five inches upon the ground. It is light, and we think it will disappear in a few days. The Indians inform me that we shall not probably find it south of the Cœur d'Aléne river; and from their statements it would seem that this river is a dividing line as regards climate.

October 24.—We started this morning with the intention of reaching the appointed place of meeting to-night.

McClellan, Minter, Osgood, Stanley, and myself, pushed ahead, and at noon we reached the old Chemakane Mission, (see sketch,) so called from a spring of that name near by. The Mission was occupied by Messrs. Walker and Eel; but, in 1849, in consequence of the Cayuse difficulties, it was abandoned. These gentlemen labored ardently for the good of the Indians. Walker

was a good farmer and taught them agriculture, and by them his name is now mentioned with great respect. The house occupied by Walker is still standing, but Eel's has been burned down. The site of the Mission is five miles from the Spokane river, in an extensive open valley, well watered and very rich. Here we met Garry and some 200 Spokanes. Garry has forwarded the letter to Donelson, but had received no intelligence of his arrival in the Cœur d'Aléne plain. We therefore concluded to encamp here, and to-morrow McClellan and myself are to accompany Garry to the Spokane House. The route by Walker and Eel's Mission to Colville unites with that taken by us twelve or fourteen miles from the Mission. It is a better route, affording good grazing during the whole distance. The Colville or Slawntehus and Chemakane valleys have a productive soil, and are from one to three miles wide, and bordered by low hills, covered with larch, pine, and spruce, having also a productive soil, which gradually become broken and lower towards the south. In the evening the Indians clustered around our fire, and manifested much pleasure in our treatment of them. Gibbs was indefatigable in collecting information in regard to these Indians. I have now seen a great deal of Garry and am much pleased with him. Beneath a quiet exterior he shows himself to be a man of judgment, forecast, and great reliability, and I could see in my interview with his band the ascendancy he possesses over them Near the Mission lives Solomon Pelter, a settler, who, by Garry's permission, has taken up his abode in this valley. I told Pelter, in reply to his request to be permitted to remain here, that though I had no power to authorize him, yet I could see no objection to his so doing; that I looked with favor upon it, and requested him to have an eye to the interests of the Indians.

I should have mentioned, in its proper place, that in Colville valley there is a line of settlements twenty-eight miles long. The settlers are persons formerly connected with the Hudson Bay Company, and they are anxious to become naturalized, and have the lands they now occupy transferred to themselves. I informed them that I could only express my hopes that their case would be met by the passage of a special act. They are extensive farmers and raise a great deal of wheat.

October 25.—Having left the necessary directions for raising camp and moving it to the place of meeting with Donelson, agreeably to the arrangement made yesterday, Captain McClellan and myself accompanied Garry to the Spokane House, hoping there to hear from Donelson. The road was slippery, in consequence of the thawing of the snow, and we were obliged frequently to dismount. We met some Spokanes, from whom I learned that Antoine, who had been sent for horses in the morning of the 23d, had gone to meet Donelson. I sent after him, directing him to return, desiring to conclude the bargains for horses before the main train arrived. We found Garry's family in a comfortable lodge, and he informed us that he always had on hand flour, sugar, and coffee, with which he could make his friends comfortable. We then went to our new camp south of the Spokane, which had been established whilst we were visiting Garry's place. From the Chemakane Mission the train left the river, and passing through a rolling country covered with open pine woods, in five miles reached the Spokane, and crossing it by a good and winding ford ascended the plain, and in six miles, the first two of which was through open pine, reached Camp Washington.

October 26, 27, 28, *and* 29.—During these days I was occupied at our camp (Camp Washington) in making the arrangements for moving westward. On the 27th, through our Indian friend Garry, I received a note from Lieutenant Donelson, informing me that he would reach my camp the next day. In this note he stated that he had fitted out Lieutenant Arnold for his

trip to Colville, and that he would himself bring the survey of the main party, all through in good order to our point of meeting. There seemed to be nothing to prevent carrying out the programme which I had determined upon at Colville. Lieutenant Donelson arrived on the 28th, and soon we all sat down to a fine supper prepared for the occasion. All the members of the exploration were in fine spirits; our table was spread under canopy, and upon it a great variety of dishes appeared—roasted beef, bouilli, steaks, and abundance of hot bread, coffee, sugar, and our friend McDonald's good cheer. But the best dish was a beef's head, cooked by friend Minter in Texas fashion. It was placed in a hole in the ground, on a layer of hot stones, with moss and leaves around it to protect it from the dirt, and then covered up. There it remained for some five or six hours, when removing it from the place where it was deposited the skin came off without difficulty, and it presented a very tempting dish, and was enjoyed by every member of the party.

The question now was, were our animals ready for the journey? Those of Lieutenant Donelson were carefully inspected by myself, and were generally thin and leg-weary; and believing that it might be practicable to run from the Sound to the Sno-qual-moo Pass, and thus make the connexion, I was unwilling, after so much labor and fatigue had been gone through with, to assign the gentlemen to duty, when they did not have confidence in their means, unless it was a case of imperative necessity. I requested the gentlemen whom I proposed to put in charge of these operations—Captain McClellan and Lieutenant Donelson—to inspect the animals and give me their judgment as to whether they would be willing to go on with the duty which I had in mind, with such means as I could furnish them. Whilst both were ready cheerfully to conform to any direction, they did not desire to go upon the duty; and accordingly, somewhat reluctantly, I determined to send the whole party to the Walla-Walla, thence to the Dalles and Vancouver, and thence to Olympia, making carefully a survey of the country on the route. I will here observe that all the gentlemen were too much influenced in their judgment by the belief that snows would fall early and deep in the Sno-qual-moo Pass, and on the route from the Cœur d'Aléne, under the base of the Bitter Root, to the Walla-Walla. The little fall of snow which I have mentioned—although in snow countries it is simply an incident of the fall, having nothing to do with betokening the approach of winter, but rather indicating, if anything, a late winter—had not been appreciated, and was thought to indicate that winter was already upon us. The necessary instructions were issued accordingly. I sent word by an Indian expressman to Lieutenant Arnold, at Colville, informing him of the arrangements, and also letters to Lieutenant Mullan and Mr. Tinkham, at Fort Owen; for I was now satisfied, from what I had gathered up on the route, that Mr. Tinkham would find great difficulty in moving over the southern Nez Percés trail to Fort Walla-Walla in December. The fall of snow varies exceedingly at short distances apart on the Bitter Root mountains, as I had then reason to believe, and as was afterwards demonstrated. I still desired that Lieutenant Donelson should go up the Cœur d'Aléne, although all the other parties went on the direct route, but he did not desire to do this. And I will again observe, that had I possessed at Camp Washington information which I gained in six days afterwards at Walla-Walla, I should have pushed the party over the Cascades in the present condition of the animals; but Captain McClellan was entitled to weight in his judgment of the route, it being upon the special field of his examination.

Having secured the services of Garry and his brother to accompany us, at 4 o'clock p. m. we left Camp Washington, and proceeding a little south of east, ascended a succession of un-

dulating hills, to a region of high table-land, upon which a few insolated pines could here and there be seen. After journeying thirteen miles we halted at a small stream called Se-cule-eel-qua, near which the soil is very fertile, and the grass fine and of luxuriant growth. Like most of the streams in this region, it is bordered by willows, thorns, silver poplars, and other trees of smaller growth.

October 30.—We commenced to move at early sunrise, and, after travelling fifteen miles through a country of broken and rugged aspect, relieved by marshy places and small ponds, we made a noon halt, where there was grass and water, and near by there was a spring frequently used as a camping ground. Trap rock covers more than one-fourth of the area of the earth's surface, and in consequence of its projection the path is rendered very tedious to the animals. This portion of the prairie is almost destitute of fire-wood, but is well watered. At 3 p. m. we encamped on a small lake, twenty-two miles from our place of departure in the morning. In view of this camp were the graves of a number of Spokane Indians, indicated by mounds of stones designed to protect the bodies from the wolves, and by poles supported in an upright position by the stones. It was the usage, until within a few years past, for the Spokanes and other northern tribes toward the Pacific to slay the horses and cattle of the deceased at his grave, and also to sacrifice his other property; but they are gradually relinquishing this pernicious practice, under the influence of the counsels and example of the white man.

Garry informs us that six miles south of our present camp there is a stream called the Sin-sae-ghi-aul-tan, (cray-fish,) running to a lake still further south. He also says that the language of the Peluse and Yakima Indians is the same, and that of the Colville and Okinakane nearly the same as the Spokane.

October 31.—We continued to follow the general course of the stream upon whose banks we were encamped, and after riding eight miles we crossed another small stream called Snae-peene, or Narrow creek, and half a mile beyond we beheld an attractive camping ground, it being the one we desired to reach yesterday, but which was represented by Garry to be too far for the day's journey. The stream just mentioned rises in a chain of small lakes south of our last camp. These lakes abound in wild fowl, which at this season, and indeed until the last of November, are very plentiful, and they are therefore much resorted to by the Spokane and other Indians. We saw in one of these lakes, surrounded by ducks and geese, a pair of white swans, which remained to challenge our admiration after their companions had been frightened away by our approach.

Garry assures us that there is a remarkable lake called En-chush-chesh-she-luxum, or Never Freezing Water, about thirty miles to the east of this place. It is much larger than any of the lakes just mentioned, and so completely surrounded by high and precipitous rocks that it is impossible to descend to the water. It is said never to freeze, even in the most severe winters. The Indians believe that it is inhabited by buffalo, elk, deer, and all other kinds of game, which they say may be seen in the clear, transparent element. He also narrates the story of a superstition respecting a point of painted rock in Pend d'Oreille lake, situated near the place now occupied by Michel Ogden. The Indians, he says, do not venture to pass this point, fearing that the Great Spirit may, as related in the legends, create a commotion in the water, and cause them to be swallowed up in the waves. The painted rocks are very high, and contain effigies of men and beasts, and other characters, made, as the Indians believe, by a race of men who preceded them as inhabitants of the land.

MOUTH OF [illegible]

Stanley Del.

Sarony, Major & Knapp Lith. 449 Broadway N.Y.

PELUSE FALLS

Our route to-day has been through a rocky and broken country, and after a march of 32 miles we encamped on a small stream called En-cha-rae-nae, flowing from the lake where we last halted, near a number of large natural mounds. Here we met with a discharged servant of the Hudson Bay Company and his family, on their way to the old Presbyterian mission on the Spokane river.

November 1.—Our course lay down the valley of the En-cha-rae-nae, a rugged way beset with deep clefts in the volcanic rocks. We crossed the Peluse river near the mouth of the En-cha-rae-nae, and near the stream flowing from the never-freezing lake En-chush-chesh-she-luxum, and twelve miles from the mouth of the Peluse. Four miles from our place of crossing the Peluse runs through a deep cañon, surrounded by isolated volcanic buttes, to its junction with Snake river. We met two Peluse Indians on the En-cha-rae-nae, who informed Garry that there were no Indians at the junction of the Peluse. They accompanied us to assist in crossing our animals and baggage. On the Peluse we fell in with two lodges of Indians, and saw a large number of horses belonging to another camp just arrived from up the river.

At 2 p. m. we arrived at the mouth of the Peluse river, (see sketch) and, crossing Snake river, we encamped on its southern bank, several Peluse Indians accompanying us, and among them a chief from a band but a few miles distant from our camp, Wi-ti-my-hoy-she. He exhibited a medal of Thomas Jefferson, dated 1801, given to his grandfather, as he alleges, by Lewis and Clark.

Not having visited them myself, the following description of the falls of the Peluse was kindly furnished me by Mr. Stanley, who saw them in the year 1847:

FALLS OF THE PELUSE.

The Peluse river flows over three steppes, each of which is estimated to have an ascent of a thousand feet. The falls descend from the middle of the lower of these steppes. There is no timber along the course of this stream, and but few willow or other bushes; yet the soil is fertile, and the grass nutritious and abundant even in winter. The fall of water, which is about 30 feet wide, cannot be seen from any distant point; for flowing through a fissure in the basaltic rock, portions of which tower above in jagged pinnacles, it suddenly descends some 125 feet into a narrow basin, and thence flows rapidly away through a deep cañon from a point from which the annexed view was sketched. The distance from the falls to Snake river is about nine miles. The valley widens considerably for about half a mile from the mouth of the Peluse. The home of the Peluse Indians is near this junction, where they devote much of their time to salmon fishing. The salmon ascend to the falls; but these Indians have a legend which tells of the wickedness of the Indians higher up the country, and how the Great Spirit, in his displeasure, placed the falls as a barrier to the further ascent of the salmon.

November 2.—I have referred, in an early stage of this narrative, to the condition of my health, and will state that not a day was I on the road from Fort Benton to this point that I did not suffer much. The day I made my long ride to Colville, I was so feeble and exhausted that, on making my noon halt after moving fifteen miles, I was obliged to have my bed spread in order to rest; but the idea of meeting gentlemen so soon, from whom I had so long been separated, enabled me to bear the fatigues of my afternoon fifty miles ride to Colville. Although in great suffering, I determined to move with Garry from Snake river to Fort Walla-Walla to-day, leaving Mr. Stanley to come on with my party and train in two days. I desired to save a day, in order to collect information at Walla-Walla, and to visit the Walla-Walla valley.

Accordingly we set off. It required me three hours to get my courage up to the sticking point, so that I could bear the pain growing out of travelling at a gait faster than a walk ; but getting warm in the saddle we increased our speed, and on reaching the Touchet we dismounted for a slight halt. Pushing on a little before two o'clock we reached Fort Walla-Walla at sundown, moving the last twenty-five miles at the rate of about eight miles an hour, and were there hospitably received by Mr. Pembrum, the factor in charge, and after a little conversation I refreshed myself with reading some late papers. On the road my time was much occupied in studying the deportment of the mountain ranges in view, and all the peculiarities of the country about me, to judge something of its winter climate and the probable falls of snow ; and on reaching Walla-Walla I became satisfied from these things, and especially from a view of the highest spur of the Blue mountains in sight, that the snows of the Cascades could not be so formidable as they had been represented. I accordingly determined to search throughly into this matter at Walla-Walla.

November 2.—The country between the Snake and Walla-Walla rivers is over high rolling prairies. On the road I travelled the grass was uniformly good, but on leaving the Snake the first water was the Touchet, 27½ miles distant. This was the longest march we had accomplished without water after leaving Fort Benton, perhaps the longest between the Mississippi and the Columbia. Captain McClellan, by a slight change of direction, striking the Touchet higher up, and crossing the Walla-Walla valley by a more central line, found good water and camps at less that 20 miles apart.

November 3 to 8.—I remained in the Walla-Walla country during these days, spending two days up the valley, and the remainder at the fort. The valley which I visited on the 4th and 5th of November I was greatly pleased with. Mr. Stanley, with the train, reached the fort on the 3d, and on—

November 4.—We started upon the trip through this valley, riding upon our horses. Arriving at the Hudson Bay farm, we exchanged them for fresh ones, sending back to Walla-Walla the old ones by an Indian. This farm is 18 miles from Walla-Walla, and is a fine tract of land, well adapted to grazing or cultivation. It is naturally bounded by streams, and is equivalent to a mile square. There is the richest grass here that we have seen since leaving St. Mary's. Two herders tend their animals, and a small house is erected for their accommodation. From this we went to McBane's house, a retired factor of the company, from whence we had a fine view of the southern portion of the valley, which is watered by many tributaries from the Blue mountains. The land here is very nutritious. McBane was in charge of Fort Walla-Walla during the occurrence of the Cayuse difficulties. Thirty miles from Walla-Walla, and near McBane's, lives Father Chirouse, a missionary of the Catholic order, who, with two laymen, exercises his influence among the surrounding tribes. A party of emigrants, who had lost nearly all their animals are sheltered here at this time. From Chirouse and McBane I learned that the emigrants frequently cast wishful eyes upon the valley, but having made no arrangement with the Indians they are unable to settle here.

A sketch is here given of old Fort Walla-Walla.

November 5.—We remained with Mr. McBane over night and returned to the fort to-day by the way of the Whitman's mission, now occupied by Bumford and Brooke. They were harvesting, and I saw as fine potatoes as ever I beheld—many weighing 2 pounds, and one weighing 5½. Their carrots and beets, too, were of extraordinary size. Mr. Whitman must

have done a great deal of good for the Indians. His mission is situated upon a fine tract of land, and he had erected a saw and grist mill. It is said that his death was brought about by the false reports of a troublesome half-breed, who reported having heard Mrs. Whitman say to her husband, when speaking of the Indians, "We will get rid of them some day." From Bumford's to the mouth of the Touchet are many farms mostly occupied by the retired employés of the Hudson Bay Company. On our return we met Pu-pu-mux-mux, the Walla-Walla chief, known and respected far and wide. He possesses not so much intelligence and energy as Garry, but he has some gifts of which the latter is deprived. He is of dignified manner, and well qualified to manage men. He owns over 2,000 horses, besides many cattle, and has a farm near that of the Hudson Bay Company. On the occurrence of the Cayuse war he was invited to join them, but steadily refused. After their destruction of the mission he was asked to share the spoils, and again refused. They then taunted him with being afraid of the whites, to which he replied, "I am not afraid of the whites, nor am I afraid of the Cayuse. I defy your whole band. I will plant my three lodges on the border of my own territory, at the mouth of the Touchet, and there I will meet you if you dare to attack me." He accordingly moved his lodges to this point, and remained there three or four weeks. Stanley was on his way from Walker and Eel's Mission to Whitman's Mission, and, indeed, was actually within three miles of the Mission when he learned of the terrible tragedy which had been enacted there, and the information was brought to him by an Indian of Pu-pu-mux-mux's band. Pu-pu-mux-mux has saved up a large amount of money, (probably as much as $5,000,) still he is generous, and frequently gives an ox and other articles of value to his neighbors. Some of his people having made a contract to ferry the emigrants across the river who crossed the Cascades this year, and then having refused to execute it, he compelled them to carry it out faithfully, and, mounting his horse, he thrashed them until they complied. He has the air of a substantial farmer.

CHAPTER VIII.

FORT WALLA-WALLA TO PUGET SOUND.—SUBSTANCE OF REPORTS OF MESSRS. GIBBS, ARNOLD, SUCKLEY, McCLELLAN, AND TINKHAM.

MR OSGOOD MOVES FOR THE DALLES —NACHES PASS FREQUENTLY OPEN TILL DECEMBER —LIEUTENANT DONELSON AND CAPTAIN McCLELLAN REACH WALLA-WALLA.—INCIDENTS OF LIEUTENANT MACFEELEY'S TRIP.—A SOLDIER LOSES THE TRACK IN THE SNOW —IS CARED FOR BY NEZ PERCÉS —GOVERNOR STEVENS DESCENDS THE COLUMBIA IN A CANOE.—REACHES THE DALLES —MAJOR RAINS.—COLONEL BONNEVILLE —VANCOUVER.—OLYMPIA.—MR. GIBBS DESCENDS THE COLUMBIA —BAKER'S BAY.—SHOALWATER BAY.—OYSTERS.—WILLOPAH RIVER.—GOVERNOR STEVENS VISITS VANCOUVER'S ISLAND.—PORT TOWNSEND.—STRAITS OF FUCA —NEEAH BAY.—LIEUTENANT ARNOLD AND DR. SUCKLEY REACH OLYMPIA —SUMMARY OF LIEUTENANT ARNOLD'S TRIP.—ASCENDS THE COLUMBIA TO THE MOUTH OF CLARK'S FORK.—KETTLE FALLS.—THE GREAT PLAIN —THE SPOKANE.—THE GREAT COULÉE.—THE YAKIMA.—SNAKE RIVER.—THE FATHERS OF THE LOWER PEND D'OREILLE MISSION AND DR. SUCKLEY.—DR. SUCKLEY DESCENDS THE BITTER ROOT IN A CANOE.—IGNATIUS MISSION.—ARRIVES AT FORT COLVILLE.—REACHES VANCOUVER.—HIS COLLECTION OF SPECIMENS OF NATURAL HISTORY AND GEOLOGY.—CAPTAIN McCLELLAN'S TRIP.—LEAVES OLYMPIA IN A CANOE.—ARRIVES AT STEILACOOM.—SNOHOMISH RIVER.—RETURNS TO OLYMPIA —MR TINKHAM'S TRIP.—LEAVES THE JOCKO RIVER.—ARRIVES AT FORT BENTON —FORDS THE MISSOURI.—PRICKLY PEAR CREEK.—LITTLE BLACKFOOT AND HELL GATE RIVERS.—CROSSES BITTER ROOT RANGE —DESCRIPTION OF THE ROUTE EXPLORED —CLEAR WATER VALLEY —REACHES WALLA-WALLA.—RECEIVES INSTRUCTIONS FROM GOVERNOR STEVENS —ASCENDS THE COLUMBIA TO MOUTH OF THE YAKIMA.—ASCENDS THE YAKIMA.—KLE-ALLUM LAKE.—PAYS GREAT ATTENTION TO THE MEASUREMENT AND EXAMINATION OF THE SNOW.—DESCENDS THE WESTERN SLOPES OF THE YAKIMA PASS —NOOK-NOO RIVER —RANGER'S PRAIRIE.—FALLS OF THE SNOQUALMOO.—REACHES SEATTLE.

Mr. Osgood moved off with my little party on the 6th for the Dalles, I having, with Mr. Stanley, determined to go down the river in a canoe, to make an examination of it; on which day I had the pleasure of making the acquaintance of Pu-pu-mux-mux in person. I ascertained from Mr. Pembrum, Pu-pu-mux-mux, and other persons, that the Nachess Pass was frequently open until December. Mr. Pembrum's own father took a band of horses from Walla-Walla to Steilacoom, some years since, in the month of December; and I sent for and closely interrogated one of the voyageurs who was with the party, and who fully confirmed the statement of Mr. Pembrum. The military road had been so far opened from Fort Walla-Walla to Fort Steilacoom as to be practicable for wagons, and I now determined to send Mr. Lander over this route, in order to run our line for Puget Sound.

Accordingly I made arrangements with Mr. Pembrum to furnish animals for this duty, and gave to Mr. Lander the necessary written instructions. Under previous arrangements, made at Camp Washington, his duty was, in connexion with the odometer survey, to continue the examination down the valley of the Columbia; but this work I considered as essentially done by the operations of Lieutenant Saxton, and by what would be done by the other parties, and especially by my own personal observation; for before leaving the city of Washington I had made myself acquainted with the character of the country between the Columbia river and Puget Sound, and knew that it was so favorable that it had been an idea, presented years ago, to connect their waters by a canal, so easy were the grades, and so low was the dividing ridge. The Columbia valley itself was the valley of a great stream; and the reports which we had of it from previous explorers—from Frémont, Captain Wilkes, and the many narratives both of American and British traders and employés—left it certain, in the minds of all reflecting and investigating gentlemen, that the route was practicable. I conceived it to be my duty so to manage the exploration as to develop unknown facts and extend existing knowledge. Hence my desire to run the line over the Cascades to the Sound. On the 6th Lieutenant Donelson,

Stanley Del. Sarony, Major & Knapp Lith[s] 449 Broadway N.Y.

DALLES

G. Sohon del.

Sarony, Major & Knapp Lith. 449 Broadway N.Y.

FORT VANCOUVER, W. T.

CASCADES OF THE COLUMBIA

CAPE HORN—COLUMBIA RIVER

and on the morning of the 7th Captain McClellan, reached Walla-Walla, where they made their arrangements to continue down the river.

Before, however, I start down the Columbia river I will give the incidents of Lieutenant Macfeeley's return trip to the Dalles.

Crossing by the route of the southern Nez Percés trail, Lieutenant Macfeeley, for eight days, continued climbing mountain after mountain, the difficulties increasing as he proceeded; the mountains seemed to have no dividing ridge, but are an immense mass, broken into conical peaks and lateral spurs, and all thrown together and piled one upon another in wildest confusion. On the summit of two of the mountains he found snow to the depth of three or four inches, and it was still snowing there, while in descending into the valley it changed into sleet and rain. This was between the 7th and 15th of September.

One of the soldiers with him lost the track in the snow, and was left behind, after two days' search, but finally found his way to the plains, and was taken care of by the Nez Percés Indians. Seventeen of his horses gave out on the way, which had been, however, exhausted previously by carrying provisions from Fort Dalles to Bitter Root valley.

November 8.—Having given Mr. Lander his written instructions, and in conversation endeavored to impress him with the entire feasibility of the enterprise intrusted to him, I started down the river in a canoe, and reached the Dalles on the 12th.—(See sketch.) We took with us two days' provisions, and were four days in reaching the Dalles, having been detained nearly two days in camp by a high wind which blew up the river; but we eked out our scanty stores by the salmon generously furnished us by the Indian bands near us. At the principal rapids I got out and observed the movements of the canoe through them, and, from the best examination which I was able to make, I became at once convinced that the river was probably navigable for steamers; at all events, worthy of being experimentally tested. I remained at the Dalles on the 13th to make arrangements for the moving forward of the parties and for herding the animals, looking to a resumption of the survey, where I was the guest of Major Rains, and had a most pleasant time, meeting old acquaintances and making new ones with the gentlemen of the post. On the 14th I reached the Cascades, where I passed the night. Here I met several gentlemen—men who had crossed the plains, and who had made farms in several States and in Oregon or Washington—who had carefully examined the Yakima country for new locations, and who impressed me with the importance of it as an agricultural and grazing country. November 15th we went down the river in a canoe, and on the 16th reached Vancouver, (a sketch of which is here given,) where I remained the 17th, 18th, and 19th, as the guest of Colonel Bonneville, and where I also became acquainted with the officers of the Hudson Bay Company.—(Two sketches are here given, one of the Cascades of the Columbia river and the other of Cape Horn.)

Leaving Vancouver on the 20th, I reached Olympia on the 25th, where for the first time I saw the waters of Puget Sound. No special incident worthy of remark occurred on the journey, except that I was four days going up the Cowlitz, in drenching rains, and two nights had the pleasure of camping out. I will now advise voyageurs in the interior, when they get suddenly into the rains west of the Cascades, to take off their buckskin underclothing. I neglected to do this, and among the many agreeabilities of this trip up the Cowlitz was to have the underclothing of buckskin wet entirely through. I was enabled to examine the country pretty carefully all the way to Olympia, and had with me a very intelligent man who could point out localities and inform me about the country not in view of the road; and I saw that not only was

it entirely practicable for a railroad line to the sound, but that the work was light, and the material for construction of all kinds entirely inexhaustible. There was building stone, there was timber, there was sand, materials for ballasting, and inconsiderable rock cutting. After considerable delays at Vancouver, the gentlemen of the parties under Captain McClellan and Lieutenant Donelson arrived at Olympia for office duty, being preceded a few days by Mr. Lander, who, for reasons not conclusive to my mind, did not persevere in the examination of the Nachess Pass. One of his reasons for not continuing his examination was, that it was not on the railroad line; which did not apply, because that fact was well known to him previously, having been announced to him positively in my written instructions. I did not censure Mr. Lander for not continuing on this duty, as I know the perplexity of mind in which one is placed by the contradictory character of the information gained; but I resolved to get my line to the sound, and accordingly despatched an express to the Walla-Walla, directing Mr. Tinkham on his arrival at that point to cross to Puget Sound by the Sno-qual-moo Pass, my object being two-fold: to get at some facts which would decisively settle the question of the depth of snow, in regard to which Captain McClellan and myself differed, as well as really to connect our work with the sound itself. I will here observe that Mr. Gibbs, instead of accompanying Captain McClellan to the sound, under his directions, went to Astoria and thence to Shoalwater bay, in order to examine the country. The following is a summary of his report:

MR. GIBBS'S REPORT.

Soon after the arrival of the expedition at Vancouver, Mr. Gibbs was sent by Captain McClellan with directions to make a reconnoissance of the country about Shoalwater bay, a large sheet of water just north of the mouth of the Columbia, which was beginning to attract much attention from the profitable trade in oysters lately sprung up there, though the existence of such a large bay was only made known within a year, having been overlooked by all the navigators who explored the coast.

Going down the Columbia by steamboat he reached Baker's bay, and crossed the narrow neck of land, three or four miles wide, which separates the Columbia at that point from Shoalwater bay. Passing through this in a small boat, he was enabled to make a general sketch of its outlines, connecting the southern and larger end with the northern, which had been partially surveyed by the officers of the United States Coast Survey steamer Active. Its length he estimates at thirty miles, and its width to average eight. Its entrance, lying twenty-five miles north of the Columbia river, is six miles wide, and has two channels, with 3 to $3\frac{1}{2}$ fathoms depth, and the northern one a good beating channel.

The greater part of the bay becomes bare at very low tides, though from four to fifteen fathoms remain in the channels, affording good anchorage at several convenient points.

Between the south end of the bay and the Columbia the land is so low that a canal of a few hundred yards length would connect the waters, and make a free navigation for small steamboats as far as the head of tide-water in the Willopah, which runs into its north end, a distance of forty miles in the direction of Olympia.

The peninsula separating the south end of this bay from the Pacific is not over a mile wide, and consists, in part, of sandy prairie, with some salt marsh and cranberry swamps. A similar tract extends from the mouth of the bay north to Gray's harbor, twenty-one miles distant, and the beach of both portions is hard sand, over which loaded wagons may be driven.

Three considerable rivers empty from the Coast range into the bay from the east, the Willopah, Naysal, and Co-palûx, (usually abbreviated into Palûx.)

The tide flows up these from five to fifteen miles, and so far vessels can easily go. Large barks have loaded with lumber several miles up the Willopah, which is the largest, and a considerable amount of piles and square timber has been shipped from different parts of the bay to San Francisco. The country bordering it, except along the sea beach, is heavily wooded with fir, spruce, hemlock, and cedar, *(Arbor vitæ,)* and along the river is fine maple and alder, all easily accessible, and for cutting which a saw-mill has already been erected. Besides several claims taken for farming and lumbering, a settlement has grown up from the oyster trade at the north end of the bay, opposite the entrance. The oysters are gathered, mostly, by Indians, from whom they are bought by the white settlers, in exchange for goods, and sold alongside the vessel for $1 50 per bushel, but in San Francisco are worth $7, there being much loss in their transportation. Fall salmon, sturgeon, and other fish are abundant, promising a profitable fishery at a future period.

The principal object of his journey being to explore a route connecting this bay with the interior, he learned on inquiry that an old Indian trail, unused for many years since the extinction of the tribe through whose country it ran, led from some point on the Willopah across the coast hills to the road leading from the Cowlitz to Puget Sound, and that the journey could be made in two days. He found it, however, impossible to obtain Indian guides at that season, the few remaining at the bay who had ever travelled over it, representing it as entirely overgrown and difficult to follow. Three of the citizens, however, Messrs. J. L. Brown, Charles Stuart, and Samuel Woodward, volunteered to accompany him, and he concluded, at least, to make the attempt. On December 17 they went fifteen miles up the Willopah in a canoe, and then started on foot, taking six days' provisions. The densely wooded nature of the hills and the rainy weather, preventing them from picking a route along the ridges, they were compelled to follow the valley, occasionally fording the river at the bends. Finding, after three days' travel, (having to cut a way for long distances through the underbrush,) that they had only made fifteen miles, and being apprehensive that they might be caught in a snow-storm, they concluded to return, having ascertained the general direction of the valley, and marked the beginning of the route.

The lower part of the Willopah is bordered by tide-lands, much of them excellent for grazing, and parts for cultivation. The river is a mile wide at its mouth, narrowing to twenty-five yards beyond the influence of the tides, which is also about the width of the channel at low tide. Above this it is a rapid, shallow stream, navigable only for canoes, very winding, and with some bottom land subject to overflow. At the head of navigation also open prairies commence, varying from thirty to five hundred acres in extent; the rest of the valley is level, but covered with timber, mostly vine maple, easily cleared. The whole valley above tide-water embraces an area twenty miles long and ten wide. Towards the head of the river the hills separating it from the Chehalis and Columbia appeared quite low.

From observation, as well as from the reports of the Indians, this could form no serious obstacle to a road towards the sound, which could probably be made very complete for $50 per mile. Being instructed, also, to inquire concerning other routes between the mouth of the Columbia and the sound, he learned that, up the branch called Gray's river, there was a valley narrower than that of the Willopah, lightly timbered, and with a rich black soil, through which, and over a range of hills, there could probably be made a good road to the upper Chehalis, where it would intersect the Cowlitz road. Another route would lead up the Elokamin or Strong's river from Kathlamet to the same points, having the advantage of an excellent landing for the

steamers on the Columbia at all seasons. The importance of a direct communication between so important a harbor as Shoalwater bay and the sound is obvious; and the connexion once established across the Coast range, would make the distance from the mouth of the Columbia forty-five miles by steamboat, and not over eighty by land, while it is at present sixty by steamboat, thirty by canoes up the Cowlitz, and fifty by land to Olympia.

Previous to the arrival of Captain McClellan I had sent for gentlemen who had crossed the Sno-qual-moo and the Nachess Pass, men of intelligence and known reliability, and conferred with them carefully in regard to the character of the route, the probable depth of snow, and the habits of the Indians, as to crossing them in the winter; and learned that it was no uncommon thing for Indians on horseback to come from the Yakima country, through the Sno-qual-moo Pass, to the sound in the months of winter. I need not tell the reader the kind of population that is to be found in a distant Territory. They have crossed the mountains, and made the long distance from the valley of the Mississippi to their homes on the Pacific; they have done so frequently, having to cut out roads as they went, and knowing little of the difficulties before them. They are therefore men of observation, of experience, of enterprise, and men who at home had, by industry and frugality, secured a competency and the respect of their neighbors; for it must be known that our emigrants travel in parties, and those go together who were acquaintances at home, because they mutually confide in each other. I was struck with the high qualities of the frontier people, and soon learned how to confide in them, and to gather information from them.

Soon after Captain McClellan's arrival I directed him to go down the sound, make an examination of the several harbors which come into competition for the depot of a railroad, and to take up from the sound the line of railroad to the Sno-qual-moo Pass; and soon afterwards, with Mr. Gibbs, I went down the sound myself, in order to visit and take a census of the Indian tribes, learn something of the general character of the sound and its harbors, and to visit Vancouver's island and its principal port, Victoria. In the discharge of this duty, which was done on a little Newport sail-boat, called the Sarah Stone, I visited Steilacoom, Seattle, Skagit Head, Pennis cave, the mouth of the Skagit and the Samish rivers, Bellingham Bay, passed up the channel De Rosario and down the channel De Haro to Victoria, and on my return made Port Townsend and several other points on the western shore of the sound. We examined the coal mines back of Seattle and at Bellingham Bay, and saw a large body of Indians of nearly all the tribes. I became greatly impressed with the important advantage of Seattle, and also of the importance of the disputed islands. Port Townsend, as described by Vancouver, is also an admirable harbor. Much has been said by persons who never saw Puget Sound of its fogs, but the term fog is not in the mouth of any person who ever saw that sound. I have been on the waters of the sound many weeks, and that, too, in the depth of winter, in little vessels of from four to six tons, and we never found any difficulty in moving with safety. In a geographical description which I shall give of this country, the harbors, resources, and geographical position of Puget Sound will be presented, as well as the character of the country generally, in connexion with that west of the Cascade mountains; but I will observe that, in my subsequent labors as Indian superintendent, I visited every point on the Straits of Fuca down to Neeah bay, and to the ocean on the opposite side; have been down the Chehalis river, examined Shoalwater bay, crossed over the trail which was abandoned by Mr. Gibbs from the Willopah to the Cowlitz Landing; and my Indian agents have traversed the country much between the waters of the sound and the Pacific. The Indian Agent Simmons and Special

KETTLE FALLS, COLUMBIA RIVER

Agent Shaw have gone by land from Neeah bay, west of the Coast range, to Gray's harbor; also from the Qui-naitl river, midway between Gray's harbor and Neeah bay, to the head of Hood's Canal, and from the Chehalis river, along several lines, the Satsop, Black river, and other lines, to the head of the canal and the head of the sound. In the volunteer service much information was also gained of this country, and I have freely made use of everything at my disposal in giving the geographical description; but I shall state nothing of the entire accuracy of which I am not satisfied.

I will remark that, previous to my visit down the sound, both Dr. Suckley and Lieutenant Arnold reached Olympia. Lieutenant Arnold executed the instructions which he had received from Lieutenant Donelson, to proceed to Colville from Clark's Fork, though, in crossing the intermediate divide, he encountered a considerable fall of snow, which, on the divide, accumulated to the depth of two feet, it being the snow which fell but a few inches deep in the Colville valley.

LIEUTENANT ARNOLD'S REPORT.

Lieutenant Arnold ascended the Columbia from Fort Colville to the mouth of Clark's Fork in a canoe, returning in the same way, between the 3d and 8th of November. The weather during the whole trip was very unfavorable for observations of the country or of latitude; and the only one he could make was about three and a half miles above the mouth of Clark's Fork, in latitude 49° 3′ 25″.

On the 4th and 5th snow fell to the depth of six inches, and the mountains bordering the river allowed of no extended view, and presented a remarkable similarity and an unbroken line, except where the principal tributaries broke through them. A narrow level belt of bottom-land bordered the stream, partly composed of prairies from four to six miles in length and from one to two miles wide; the rest was like the mountains, thickly wooded.

The river has a rapid current and is filled with innumerable small rapids, but that known as the Little Dalles is the only one that would impede navigation. Here the stream is only about twenty feet wide, its sides being of solid rock; the current, at that season very rapid, though the water was low, becomes at the highest floods a perfect torrent. A portage of half a mile was made in ascending, but in descending he ran through it, although innumerable eddies and whirlpools rendered the navigation in canoes rather precarious. Above Clark's Fork the Columbia continues much larger than any of its tributaries, and has a swifter and deeper current than below. Only one large stream comes in on the west, nearly opposite to Fort Colville, (the Ne-hoi-al-pit-quu,) and another above the Little Dalles, at that time a mere brook. The only one on the east side worth mentioning is Clark's Fork.

This noble stream runs through a deep gorge in the range, about a quarter of a mile from the main stream, and has two falls, one near the gorge and one at its mouth, and empties into the Columbia with a roar. The fall near the gorge is about three feet in height; that at its mouth fifteen feet, and not more than one hundred and fifty yards wide.

The Columbia at Fort Colville is about three hundred and fifty yards wide just above the Sometknu, or Kettle Falls. These consist of two pitches, one of fifteen feet and another below it of ten, and the river is narrowed to two hundred yards.—(See sketch.) An extensive and fertile bottom-land borders the river here, and extends back towards the east for some miles. This continues to border the river, with an average width of half a mile, for twenty miles down the stream, when the wooded hills come closer to the banks, higher and with numerous ravines

opening on the river, which makes a route close to its banks impossible. Small lakes occur among these hills, and timber is abundant as far as the Spokane river, a distance of twenty-five miles further. The soil is good, being composed of sand and alluvium. The western bank of the Columbia there has a barren appearance, and the hills rise from it to the height of a thousand feet, receding from the river, where it takes a great bend to the west, and is nearly destitute of timber.

The Spokane is fordable two miles above its mouth, and at its mouth is two hundred feet wide, with a rocky bottom. Its banks are very high, of precipitous basaltic rock, leaving a narrow valley between of good soil. Twenty miles up, where crossed by Captain McClellan, it is little more than a brook at low water, seventy-five feet wide and three deep.

From Lieutenant Arnold's observations along the Columbia to the Grand Coulée, and from the appearances east of Fort Okinakane, it seems that the character of the tract between the Columbia and the Okinakane gradually approaches that of the Great Plain towards the south, though more uneven and probably much better supplied with grass. The woods extend but little south of where Captain McClellan crossed it, except on the Columbia, where they extend to the Spokane, on its banks, and occur at scattered intervals below.

The Great Plain was crossed by Lieutenant Arnold sixty miles west of the route of the main expedition. He followed down the Columbia where it turns to the west, below the mouth of the Spokane, by a very rocky and dangerous trail for fifty miles, as far as the mouth of the Grand Coulée. The northern banks of the river appeared impassable. Timber continues along the slopes and cliffs, gradually diminishing, and almost entirely disappearing at last. The river runs far below the general level of the Great Plain. The Grand Coulée (see sketch) is about ten miles wide where it opens on the river at its northern end, which is a hundred feet above the water, and gradually widens towards the south; its walls, eight hundred feet high, are formed of solid basaltic rock, but diminish in height southward as the bottom rose towards the summit of the plain, until, in twenty miles distance, they ended. Numerous lateral ravines and cañons were seen running in various directions, some of them containing lakes without outlet, and streams ten feet wide and two feet deep.

The Cascade mountains were visible at the middle of the route, though from that of Captain McClellan they could not be seen. Trees disappeared entirely south of the Columbia. The trail again approaches to within twelve miles of the Columbia, about forty-five miles north of the mouth of the Yakima, and crosses a track of drifting sand-hills four miles wide, and which extend westward as far as the eye can distinguish, the gorge through which the Columbia flows being visible the whole distance. From ten miles above the Yakima to the mouth of Snake river the country is level, low, and sandy, and the banks of the latter river, for a mile up the stream, are not more than from ten to thirty feet high. The direct distance across the plain, from north to south, is from ninety to a hundred and twenty miles on all the routes traversed. The wooded hills, being the spurs of the Bitter Root mountains, border it on the east, and the Great Bend of the Columbia runs round its western portion, making the width of the woodless portion, from east to west, from one hundred and twenty to one hundred and forty miles. On the west side of the Columbia Mr. Doty found a sandy, barren sage-plain, one or two miles in width, bounded by high ridges of basaltic rock parallel to the river, between the mouth of the Walla-Walla and the Yakima.

Stanley Del.

Sarony Major & Knapp Lith. 449 Broadway N.Y.

GRAND COULEE

DOCTOR SUCKLEY'S TRIP.

Dr. Suckley had a very successful canoe trip, although greatly disappointed in not having been able to procure the means at the lower Pend d'Oreille Mission to make the distance from that point to Colville by water. I had not intended at Colville to do otherwise than advise Dr. Suckley of the difficulties of the water route between these two points, and to suggest simply, looking to his own safety, the coming over by land; but the good fathers of the Mission, in their care for his safety and their personal regard for him, refused to let him have canoes or an Indian guide.

Dr. Suckley, in preparing for his voyage down the Bitter Root, found considerable difficulty in constructing a canoe suitable for the purpose, as the Indians and white inhabitants were totally unacquainted with any means of navigating the river, neither boat nor canoe having ever ascended higher than the Horse Plain, at the junction of the Bitter Root with Clark's Fork, or Flathead river. There seems to be no inducement for them to navigate it, as their hunting grounds lie in another direction, and they are too indolent to explore a new route, if not absolutely necessary. At last a skin canoe was made of three bullocks' hides stretched over a frame, and on October 15 he embarked with two white men and an Indian as crew. No one knew anything as to the character of the river ahead of them, and it was necessary, therefore, to proceed with caution. It was found quite shallow in many places, and the canoe which, when loaded, drew only ten inches of water, had frequently to be lightened until he passed the Hell-Gate. About sixty miles below the mouth of the Hell-Gate, the mountains, crowding close upon it, make it very rapid, but further down it is more straight, deeper, and sluggish, with large flats on one or both sides of it.

From the Horse Plain down Clark's Fork to St. Ignatius's Mission, where he arrived November 8, he had to make two portages. The Hudson Bay Company were formerly in the habit of carrying up their goods in large boats to Horse Plain from the foot of Pend d'Oreille lake, making two portages on the way. Below the lake there is no obstruction for about thirty miles, when a fall of six and a half feet is met with, the river being divided by rocky islands. From this fall to a point nine miles above the lake he thinks that steamboats drawing from twenty to twenty-four inches could easily ascend, and in high water the distance might be increased from sixty to a hundred miles, or from a point ten miles below the Mission to the Cabinet, fifteen miles above the lake. A lock might readily be constructed at the falls so as to admit of navigation at all seasons. At the Cabinet the river is compressed between walls of solid rock, about a hundred feet in height, and becomes very narrow and rapid, as at the Dalles, so that the possibility of passing through with steamboats is uncertain.

The portage made by Dr. Suckley was of 1,300 paces.

From the uncertainty of the route before him Dr. Suckley was thus twenty-five days in reaching the Pend d'Oreille Mission of St. Ignatius. His provisions had become scanty, and after having devoured the last crumbs, made into a gruel with berries, they were glad to meet with a camp of Indians, not far above the Mission, who supplied them with food and treated them with great hospitality. The pious ceremonies of all these Indians, and their Christian deportment under the instructions of the missionary, Father Hoecken, were very interesting after their long and fatiguing journey, suffering from intense cold and half starved as they were. The missionaries themselves, Fathers Hoecken and Menatrie, with the lay brothers, Mageau

and Francis, received them the next day with the kindest hospitality, and gave him much important information as to the country and its inhabitants.

Their industrious labors, during the nine years since the Mission was established, are shown in the fact that they have a large dwelling-house of hewn timber, a windmill, a blacksmith's and carpenter's shops, barns, cow-sheds, and a large church.

In the church they had made and put up a carved and gilded altar, an image of the Virgin, brazen crosses, and rich bronzed fonts, all made by laborious industry with tools imported from Europe. They had made, also, a grindstone, blacksmith's bellows, ploughshares, bricks, &c.; while they manufacture their own soap, candles, and vinegar. All the buildings are of hewn timber, except those for the cattle, which are of logs. The farm consists of 160 acres of cleared land, on which they raise wheat, barley, onions, cabbages, parsnips, peas, beets, potatoes, and carrots. They have also hogs and poultry, and make their own butter and cheese. Around their houses are those of the Indians, also of hewn timber, sixteen in number, and several huts of mats and skins, this being the headquarters of the tribe, where they prefer to live and die rather than to move to other tracts higher up, where the priests wished them to go on account of the superiority of the land. Their condition has been vastly improved since the arrival of the missionaries, before which it required their utmost exertions to provide for a subsistence.

His canoe being now so rotten that, to continue down the river, he must make or buy a new one, and from receiving the false information that I had sent positive orders to him to go by land from the Mission to Fort Colville, he reluctantly left on horseback, November 10, and reached the fort on the 13th.

He supposed from what he could gather, that he might have descended the river, proceeding cautiously and making portages, though the Indians were not in the habit of going by that route. After a rest of four days in the pleasant society of Mr. Macdonald and the missionaries, he again embarked below Kettle Falls with two canoes and three Indians, and travelling about three and a half miles an hour reached Vancouver on the 6th of December. The only portage of consequence made in this part of the river was at the Dalles, of 800 paces. At the Cascades he transported his canoes by the usual route over the wooden railway. Just below the mouth of the Spokane there are a number of rock islands scattered through the river, and others occur at several other points on the river, affording an excellent support for the arches of a bridge.

Dr. Suckley also collected much valuable information concerning the manners and customs of the Indians; the habits of the salmon, which supply them with such a large share of their subsistence; the kinds and amount of game and other animals; and procured some interesting specimens of natural history and geology, in spite of the numerous disadvantages under which he labored in exploring an almost unknown river at a season so late and inclement.

The whole time, including stoppages, was 53 days, two less than had been occupied by Lieutenant Donaldson and the main train in the land journey. The actual travelling time was $285\frac{1}{2}$ hours, and the approximate distance along the windings of the river 1,049 miles, allowing an average speed of $3\frac{674}{1000}$ miles an hour.

The incidents of this trip and the season of the year show the force of character and sagacity of Dr. Suckley. Before he left the survey he received his appointment as assistant surgeon in the army, and was stationed for some years on Puget Sound and at the Dalles of the Columbia. His contributions to the natural history of this route, and especially that of the country west

of the Cascades, have been very considerable; but his services in war and peace reflect equa credit upon his high qualities, and fulfil the promises which had been given by his services on the exploration, and especially his trip down Clark's Fork and the main Columbia. During this time we were all occupied in preparing the reports of the exploration for the War Department. On the 31st of January an express messenger from Mr. Tinkham, the Sapper Wilson, reached me, informing me of his arrival at Walla-Walla, and of his having started to execute my instructions to cross over to the sound by the Snoqualmoo Pass; but he had concluded finally to go on foot, accompanied simply by Indian guides. This information was to me highly satisfactory; and, from Mr. Tinkham's known energy of character, I believed he would complete the exploration in that quarter. Captain McClellan's verbal narrative of his trip we reduced to writing. It is in substance as follows:

CAPTAIN McCLELLAN'S TRIP DOWN THE SOUND.

On December 23d Captain McClelland left Olympia in a canoe, with Mr. Minter and a small party, intending to make an examination of the Yakima passes from the west side, going by land from Steilacoom; but on arriving there he found it impossible to obtain land transportation, the Indians representing the road as impracticable at this season. He therefore resolved to proceed to the falls of the Snoqualmoo river in canoes, and thence on foot as far as possible. Proceeding from Steilacoom up the sound, he reached the mouth of the Snohomish, distant sixty-five miles, on January 1, and, going up that river and its south branch, the Snoqualmoo, reached the falls on the 7th.

No Indian could be persuaded to guide him further. The trail was entirely obliterated, and he therefore proceeded only a few miles further on foot. From the information obtained, there appeared to be no possibility of proceeding further than Lake Nooknoo; and as the barometer he had with him proved worthless, he concluded that no object would be gained by continuing onward which would compensate for the difficulties to be overcome.

The Indians represented the snow to be up to the armpits at Lake Nooknoo, and as increasing in depth thence to the pass, at the summit of which it would be found to be twenty-five feet in depth.

The Snohomish is navigable for small steamers for about twelve miles. Six miles further it forks, the Skywhamish, or north fork, being the larger of the two. The falls of the Snoqualmoo are estimated at nearly 150 feet in height, and are exceedingly beautiful. Similar falls exist at the foot of Lake Nooknoo, on the Skywhamish, the Stolukwhamish, and the Skagit.

Captain McClellan intended then to continue the journey down the sound to Bellingham bay; but on arriving at McDonough's island, on January 12, a severe snow-storm came on, with a gale, which prevented further progress. On the 14th he therefore turned back, and reached Olympia January 21, having been on the sound during the coldest period of the winter.

MR. TINKHAM'S EXPLORATIONS FROM THE JOCKO RIVER TO SEATTLE.

Somewhat unexpectedly, but to our great delight, Mr. Tinkham arrived this evening at Olympia, having crossed the Snoqualmoo Pass on the 20th day of January, and finding but six feet of snow for a short distance. Here we had the actual depth of the snow as determined by admeasurement, as well as the judgment of one of the most intelligent and able officers I ever knew, as to its depth, derived from Indian reports and statements; for, previous to the arrival of Tinkham, I had received Captain McClellan's report as to the probable depth of snow

in that pass. In the one case the depth was six feet, and in the other case it was reported to be twenty feet or more. Mr. Tinkham exhibited great hardihood, vigor, and endurance in the performance of his duty, from the time he left my camp on the Bitter Root, on the 7th day of October, until the date of his arrival in Olympia. During this time he traversed 1,164 miles of country, of which 300 were on foot. The animals, with the exception of four, which he sent back from the snows of the Bitter Root to Fort Owen, arrived safely in charge of Pearson and French. This I had the satisfaction to learn some weeks afterward in a report from Lieutenant Mullan. I will now give a brief account of this extended line of exploration by Mr. Tinkham.

Mr. Tinkham left the last camping ground made by Lieutenant Donelson with the main train on Jocko river, and travelling northwardly, followed Jocko river to its mouth, and then proceeded up the valley of the Flathead river, which he found to be wide, and partially bordered by wooded hills nearly to the lake. It is a fine, clear stream, from 100 to 150 yards in width, occasionally fordable, and with a swift current, estimated to have a descent of about ten feet per mile.

Passing around the western shore of the lake, among wooded and rocky hills, at the foot of the lake is a small green prairie of good soil mingled with fragments of trap rock.

At the upper end of the lake lies an extensive prairie, which is twenty miles in width, and extends far north of where he left it to ascend the mountains.

Following up the most eastern fork of the stream which supplies the lake, he came to the wooded mountains twenty-eight miles from the lake, closing in on the valley of the branch he followed; then, again dividing, they leave a nearly level but wooded basin for fourteen miles, where the river forks, the trail following the northern tributary. This now becomes walled in by lofty precipices, with gray, naked peaks rising in bold relief from the dark forests below them. The valley is narrow and wooded, the trail laborious and difficult, and grass scarce west of the summit. A bare, rocky, curving ridge heads the valley over which the trail winds, often only wide enough for the path of a horse, and quite impracticable for wagons. It is 2,150 feet higher than the valley, and 7,600 above the sea.

He passed this summit on the 20th of October, and although up to this time there had been fine, clear autumnal weather, as he rose in the valley frost and ice occurred, and while crossing there was a snow-storm, which continued till the next day, with severe cold weather on the way to Fort Benton, the thermometer reaching as low as 3° above 0. The contrast in the growth of the trees on the west and east sides of the mountains was remarkable. On the west they continued large and thrifty almost to the summit, but on the east, what little growth there was, was of short scrubby pines.

Mr. Tinkham, leaving Fort Benton on the 31st of October, 1853, forded the Missouri a short distance below the fort, where it was about six hundred feet wide and three feet deep. Thence he travelled up near its south bank, keeping at some distance to avoid the deep coulées, for fifty-eight miles, and passing by the Great Falls. Above these the country improves in appearance, is less broken with coulées, and not bordered by the steep bluffs as below. The soil and grass are better, and the river banks more wooded.

Belt Mountain creek where crossed was eighty feet wide, and so deep that a ford was found with difficulty.

He considered the road much better on the north and west side of the Missouri. Here he was compelled to ford the Missouri by almost impassable rocky bluffs coming down to the river,

and then continuing up the west bank from Dearborn river to Prickly Pear creek, he struck upon Lieutenant Mullan's route, as just described. The country becomes gradually more hilly, though perfectly practicable for wagons to the Little Blackfoot Pass, at the head of the last-mentioned stream. He was not much troubled either with snow or cold after getting within forty miles of the summit, the thermometer never ranging below 20° above zero, and generally much higher. On the 16th of November, he passed over in company with a large troop of Pend d'Oreille Indians returning from the buffalo hunt. The dividing ridge is a mere hill, up which, on the eastern side, loaded wagons can be drawn without serious difficulty; and the descent on the western side is, for a wagon road, all that is desirable. An inch or two of snow lay on the eastern side of this hill.

Following down the valley of the Little Blackfoot and Hell-Gate rivers, he found it unusually favorable either for a wagon or railroad route. It has an average descent of about twenty-two and a half feet per mile, and the valley generally wider than that of the Big Blackfoot, as well as less obstructed by trees, so that a small amount of labor could make it an excellent wagon road. Most of it is also desirable for settlement, and he did not consider the distance essentially increased over that by Cadotte's Pass. On the 17th he reached Cantonment Stevens, and was delighted with the Bitter Root valley.

Again starting out, on the 20th, with a fresh band of horses and provisions, he went up to the head of the valley, and left it to cross the Bitter Root range by the southern Nez Percés trail. The route explored is described as follows:

The southwest fork of the St. Mary's (Bitter Root) river is, a short distance above its union with the main stream, above eighty feet wide, three feet deep, with a bottom of large round stones of granite or gneiss. The valley is narrow, closed in by high wooded hills, and the trail leaves it near its end, a distance of twenty-four miles. The horse trail is narrow, and is not practicable for wagons. Snow appeared soon after leaving the valley of the Bitter Root, and was finally about eight inches deep, and the streams were half frozen.

After leaving this valley the trail passes over a high and hilly ridge to the Kooskooskia. It is steep and laborious, wholly impracticable for wagons. It was rendered more difficult by the snow, which covered the summit to the depth of three feet, and made the crossing a journey of three days, though only fifteen miles.

Directly across is not more than five miles, but the trail avoids the stream and follows the steep grassy slopes and ridges north of it, being less obstructed with timber. It is probably usual to make the crossing in one day.

The trail here crosses the headwaters of the Kooskooskia, which is sixty or eighty feet broad, with a pebbly bottom, and flows in a deep, gorge-like valley, wooded with pines, fir, spruce, cedar, hemlock, &c. Again, ascending the high hills on the opposite side, he was brought to a halt on the 27th November by snow four feet deep, with a steep hill before him, up which it was impossible for the animals to make their way. Here he remained reconnoitering and endeavoring to break a trail for the animals, but as two feet of snow fell in addition, and afterwards a rain, he determined to send the animals back to the Bitter Root valley, while he and the rest of the party pushed on. Accordingly, his party spent a week here engaged in making snow shoes, when each one, taking a pack upon his back, proceeded through the snow towards the Nez Percés country.

For eighty-nine miles further the trail led over the summits of high and very rugged hills covered at their tops with deep snow, and evidently forming the dividing ridge between the

Kooskooskia and a more southern branch of the Snake, as streams flowed from among them both to the north and the south. This course is, as usual with the Indians in travelling through a wooded country, selected to save themselves the labor of cutting a road through the wooded valleys. As they journey on horseback, and have no regard for the labor performed by their horses, this becomes their favorite plan, while white men would prefer to clear a way up the valley. The want of grass for their horses in the valley may be another reason for following the ridges.

The little streams crossed, though mere brooks, had each a valley sometimes a quarter of a mile wide, flat and grassy, which must of course expand further down their course; and on the Kooskooskia, which was left many miles to the north, a valley approaching to that of the Bitter Root may be expected, probably more thickly wooded, and perhaps interrupted by narrow defiles through some of the ridges which cross its course.

On December 17, after fifteen days of laborious travel, his little party emerged into the unwooded valley of the Clearwater, a few miles above its junction with the Kooskooskia, where they met with a party of the Nez Percés Indians, and remained with them nearly a week. Their horses and cattle, with some young calves, were grazing in the valley, where the grass was bright and green; and young pea-vines were several inches high, the whole valley being strongly contrasted with the mountains he had just passed over. A slight fall of snow occurred while he was there.

Going on westward, he reached Walla-Walla December 30. The country appeared to contain much excellent land along this part of the route which lay south of the Snake river which he crossed at the mouth of the Kooskooskia. The corn and wheat raised by the Indians were of good quality; and Mr. Craig, who has a farm at Lapwai, on the Kooskooskia, about forty-five miles from the mountains, raises also peas, squashes, onions, potatoes, melons, &c.

Similar fine valleys exist on the Tukanon, Touchet, and smaller streams running in on the south side of the Snake. The weather continued mild up to the time he reached Walla-Walla.

The day after his arrival he received my instructions directing him to proceed to the sound by way of the Snoqualmoo Pass, and though just after his severe hardships in the Bitter Root range, he immediately made preparations to carry them out. He reached Olympia on February 1, after a journey of twenty-four days, and thus gives the result of his observations:

On the 7th of January, with two Walla-Walla Indians, he proceeded up the Columbia till it receives the waters of the Yakima river, and then, taking the latter stream, turned westwardly to trace its waters to their source in the close vicinity of the waters flowing into Puget Sound. Passing over the intermediate portion of the route, on the 17th of January he arrived within three or four miles of the Kle-allum lake, the source of one of the principal forks of the Yakima river. To this point he had travelled without difficulty with horses, and here commenced the most laborious part of the exploration. The snow was now about two feet deep, and the weather for several days had been intensely cold, although not colder than is experienced in all our northern States at this season. No grass could be obtained near here, and the few Indians residing in the vicinity of the lake were without animals; but thirty miles lower down the river the snow was very light, not over three or four inches deep. The grass was good and exposed, and the Indian horses were in good condition.

Although, with the disadvantages under which he was placed, he was satisfied that it afforded fair facilities both in ascent and descent for a wagon and railroad, either with the use of eighty

feet grades for a limited number of miles and a short tunnel, or with a longer tunnel and easier grades.

Wishing to know the real difficulty to be apprehended from the passage of these mountains in the winter season by railroad trains, he paid particular attention to the measurement and examination of the snows on the route. From Lake Kitchelus to the summit, some five miles, and where occurs the deepest snow, the average measurement was about six feet, but frequently running as high as seven feet.

In a storm occurring on the night of the 20th about one foot and a half of this depth was deposited—a very light, dry snow. The whole of the snow was very light and dry, deposited in successive layers from one to two feet thick, and for the greater part of the route had lain undisturbed since its fall, every twig and bush bowing under their heavy burden. These snows present little obstruction to removal in comparison with the compact, drifted snow of the Atlantic States, and would cause very little detention to the passage of trains. Passing on to the west side of the Cascades the snow rapidly disappears; fourteen miles from the summit there were but eight inches of snow, and thence it gradually faded away as approach was made to the shores of the sound. For only a few miles was the snow six feet deep; the whole breadth, over twelve inches deep, was somewhat less than sixty miles in extent. Of this, forty-five miles were two feet deep and upwards, about twenty miles were four feet deep and upwards, and six miles were six feet deep.

In descending the western slope of the Yakima Pass, Mr. Tinkham judged that the natural descent of the valley of the Nooknoo was sixty feet per mile, and that it soon became less than this. He thinks that from this point westward no serious difficulty exists, and the balance of the road to Seattle may be made without objectionable grades as work of an unusually expensive character.

About seventeen miles from the summit the Nooknoo (Nooksai-nooksai) empties into the lake of the same name, and is about four miles long, the valley for this distance being densely wooded. Here the trail followed by Mr. Tinkham then left this river, (which below is called Cedar river, and empties into Dwamish lake,) and crossing a nearly level tract of woods for five miles entered upon Rangers' Prairie, a large and rich one, just above the falls of the Snoqualmoo. It is estimated that there are 10,000 acres of excellent prairie land in the vicinity of these falls, both above and below, and the falls themselves are 280 feet high. Going down the river for nine miles, Mr. Tinkham left it, and by a very circuitous route, forty miles long, reached Seattle, January 26, seven days after leaving the eastern base of the dividing ridge.

CHAPTER IX.

TRIPS OF LIEUTENANTS MULLAN AND GROVER, AND OF MR. DOTY.

Lieutenant Mullan's trip.—Ascends the Bitter Root to its source.—Quantity of snow.—Crosses Dividing Ridge.—Returns to Cantonment Stevens.—Reaches Fort Hall.—Description of Bitter Root Valley.—Delightful climate.—Reaches Ross Hole Prairie.—Ascends Big Hole Mountain.—Strikes a branch of Wisdom River.—Crosses Big Hole Prairie.—Crosses again the Rocky Mountains.—Mountain Sheep.—Medicine Lodge Creek.—Kamas Prairie Creek.—Market Lake.—Descends Snake River.—Arrives at Fort Hall.—Starts northward.—Follows High Bank Creek.—Hooked Man's Creek.—Valley of Jefferson's Fork.—Favorite Indian hunting ground.—Reaches again Wisdom River.—Its valley.—Deer Lodge.—Follows the Hell-Gate.—Conical Mound.—Hot Springs.—Reaches Fort Owen.—Lieutenant Grover's trip.—Leaves Fort Benton.—Great Falls of the Missouri.—Surveys the Missouri to the mouth of Milk River.—Bluffs of the Bear's Paw Range.—Citadel Rock.—Mauvaises Terres.—Important data.—Lieutenant Saxton descends the Missouri from Fort Benton to Leavenworth.—Lieutenant Grover leaves Fort Benton.—Reaches Cadotte's Pass.—Crosses Dividing Ridge.—Proceeds down Big Blackfoot River.—Passes Hell-Gate Defile.—Leaves Fort Owen.—Pend d'Oreille and Cœur d'Alêne Lakes.—Arrives at Walla-Walla.—Governor Stevens leaves for Washington.—Lieutenant Mullan starts from Cantonment Stevens for Fort Benton.—Crosses the Missouri on the ice.—Reaches Fort Benton.—Follows the route to Sun River.—Valley of the Little Prickly Pear Creek.—Crosses the mountains.—Follows the valleys of the Little Blackfoot and the Hell-Gate.—Reaches Cantonment Stevens.—Remarks of Mr. Doty on the same route.—Governor Stevens leaves New York.—Reaches Olympia.—Meets Lieutenant Mullan and Mr. Doty.—Higgins sent from the Dalles to Cantonment Stevens.—Summary of Lieutenant Mullan's and Mr. Doty's labors.—Lieutenant Mullan explores Flathead River and Clark's Fork.—Kamas Prairie.—Hot Spring Creek.—Flathead Lake.—Crosses Maple River.—Koutenay and Tobacco Rivers.—Ascends the latter to its source.—Falls of Tobacco River.—Headwaters of Hot Spring Creek.—Enters again Kamas Prairie.—Arrives at Cantonment Stevens.—Leaves again Bitter Root Valley.—Lou-Lou Fork.—Hot Spring, 132°.—Follows the route pursued by Lewis and Clark in 1805.—Kooskooskia River.—Enters the great plain of the Columbia.—Reaches Snake River.—Alpahwah Creek.—Crosses branches of the Tukanon and Touchet.—Meets Mr. Doty at Walla-Walla.—Reaches the Dalles, where his party is discharged.—Importance of the services rendered by Lieutenant Mullan and his party.—Incidents connected with his post in the Bitter Root Valley.—Erects four log buildings.—His judicious intercourse with the Indians.—Their regret at his departure.—Great privations endured by his party.—Valuable contributions furnished by Lieutenant Mullan to the existing knowledge of the country.

I had not mentioned in the proper place that when I parted with Garry, the Spokane chief, at Vancouver (for he was also the guest there of Colonel Bonneville) I made arrangements for him to express letters to Lieutenant Mullan, at Fort Owen, and in return to bring me news of the operations of his party; and again, in January, I also despatched Higgins, who had been our wagon and pack master, with an express to the same point. I had another object in pushing forward those expresses, which was to determine the depth of snow, from time to time, through the winter along the line of Clark's Fork, and thence to Cantonment Stevens, in the Bitter Root valley. On the 6th of March Garry reached Olympia, with Lieutenant Mullan's report of his trip to the waters of the Missouri in October and November, and of his trip to Fort Hall and back in November and January. These trips caused him and his little party to travel over 990 miles, and to cross the divide of the Rocky mountains six times—three crossings having been made in the month of December and one in the month of January.

LIEUTENANT MULLAN'S EXPLORATIONS SOUTH OF THE BLACKFOOT RIVER.

The country south of the Blackfoot river, and between the Rocky mountains and Bitter Root river, was thoroughly explored by Lieutenant Mullan in 1853 and 1854. In the latter part of October he ascended the Bitter Root to its sources, and crossed the dividing ridge to Wisdom and Jefferson rivers; and, returning to Cantonment Stevens, he again travelled over the same route between the 28th of November and 13th of December, when he reached Fort Hall, on

Snake river. Bitter Root or St. Mary's valley is about eighty miles long from north to south, and from four to seven wide; well adapted for agriculture, the soil being a rich, dark loam, mingled with sand and gravel, in which wheat, oats, and potatoes have been found to grow exceedingly well, and is naturally covered with luxuriant grass, supplying inexhaustible pasture, over which already several thousand cattle and horses were roaming and were scarcely noticed in the vast area. It has been noted, that when other valleys of the mountains are covered with snow, in this valley perpetual spring is found to reign during the whole of nearly every year. At that time (November) the mountains on each side were covered with snow from base to summit, though no traces of snow were to be met with in the valley.

The river banks are lined with cottonwood sixty or seventy feet high, and pines much larger and superior than elsewhere found, sometimes a hundred and fifty feet high and perfectly straight, with a diameter of three feet. At the forks where the prairie ends, he followed the southeast branch for twenty miles, and passing over a mountain a thousand feet high, having about two inches depth of snow on its summit, reached Ross's Hole prairie on the 3d of December. He describes this prairie as being fourteen miles long and four wide, where the grass was six inches long and quite green. A wagon road passes round the mountain leading to this prairie, and crosses it, traversing the dividing ridge of the Rocky mountains, about twelve miles north of his route. The weather still continued mild and pleasant, with showers of rain. Two branches of the Bitter Root river flow through the prairie, having their sources about four miles further east in the range of mountains forming the dividing ridge between the Missouri and Columbia rivers. This portion of the Rocky mountains is made up of ridges of mountains and patches of prairie, varying from 10 to 30 miles in length, and as many in width. Ascending the dividing ridge here, called Big Hole mountain, he found its western slope perfectly clear of snow, affording a very excellent road, though up a very steep ascent. On its summit snow was a foot deep, the thermometer falling from 47° at the base to 36° at the summit, which he estimated to be 3,000 feet high. The western slope he considered practicable for the ascent of empty wagons, and very good for the descent of full ones.

The descent towards the Missouri side is very gradual, so much so that were it not for the direction taken by the water it might be considered an almost level prairie country. This mountain, which is of granite formation, is covered with white pine, growing from fifty to seventy feet high. Here striking upon a branch of Wisdom river, a tributary of the Jefferson Fork of the Missouri, he followed it down through a well-timbered valley about two miles wide, occasionally forming prairies from six to twelve miles long and from three to four wide.

From his camp on this stream, of December 4, he had a fine view of Big Hole prairie, (see sketch,) which is about fifty miles long and fifteen wide. Crossing this on the following day, December 5, its western side was found to be covered with snow some six inches deep, though none appeared on its eastern. It is hemmed in by high mountains on every side except the southeast, where Wisdom river passes out from it.

South of this large and beautiful prairie he crossed a ridge separating it from the valley of the Jefferson Fork by an excellent wagon road. The country now became more rough and barren; no trees except the pines on the summits of the mountains and an occasional cottonwood. Artemisia, or wild sage, with a trunk a foot in diameter, became the only fuel. The weather became much colder, the thermometer, on December 6, being as low as 12°, and the streams were frozen so hard as to be crossed without difficulty. Narrow valleys, with fine grass, lined the branches of Jefferson Fork; but there was no timber on the river banks at less

than a distance of twenty miles between the groves, and willow bushes grow only five or six feet high.

Following up the southwest branch of Jefferson river, called Red Butte creek, from the color of the hills around, he found no vegetation but artemisia, and on the south side of some of the hills a few stunted pines and cedars. The road was, however, very level and good, until, leaving the valley, it passed for six miles through a cañon, and twenty-eight miles further reached the foot of the dividing ridge between the Jefferson Fork of the Missouri and the Lewis Fork, or Snake river of the Columbia, where there was a little good grass and wood. He again crossed the Rocky mountain ridge on December 9. The ascent was quite steep, and covered with snow a foot deep; in some places drifted to three feet, so that the animals got through with much difficulty. The air on top was exceedingly cold, and the southwest wind blew clouds of snow in their faces. The descent was even more steep than the ascent, compelling them to dismount and travel on foot. At the base of the dividing ridge the course for several miles lay through a winding gorge to the source of the Medicine Lodge creek, which for fifteen miles has a very pretty valley, but without grass, or any wood except willow. Numbers of mountain sheep were seen on the rugged mountains around, but no other game occurred after leaving the Bitter Root valley. Crossing over the summit of a low ridge by a rough and rugged road, he came upon an immense sage prairie about twenty miles in width, extending as far south as Snake river; travelling across which, he again came to the Medicine Lodge creek, which he crossed, and proceeded sixteen miles further to a stream known as Kamas Prairie creek.

Sixteen miles from the Kamas Prairie creek he came in view of a large lake, which he called the Market lake, for the following reason: It would seem that in years past the bed of this lake was an immense prairie bottom or basin, and a favorite resort for game of all kinds; even, indeed, the buffalo have been killed in and near it in large numbers, the evidences of which were shown by the skulls of the animals found near the present border of the lake.

So abundant, indeed, was the game here that the trappers and mountain-men of that day, who in squads and bands trapped and hunted in this wilderness of mountains, always said to each other, when their supply of subsistence grew scanty, "let us go to the market," referring to this resort of the herds of game, and they never visited it in vain until, by one of those strange freaks of nature in this valley of the Snake river, which is fed at many points throughout its length by subterranean streams, this market was converted into an immense sheet of water. It is only accounted for by supposing that the streams making down from the Snake River mountains, and losing themselves in the sand or sage desert of the valley, break forth at or near the latter, which is thus fed from year to year by the meltings of the snows and the rains from these mountains. In order, therefore, to retain and hand down the name of this once favorite resort, and the legend connected with it, Lieutenant Mullan named this sheet of water the Market lake.

Travelling along the banks of this lake for eight miles, he left it, and in a short time fell upon the main stream of Snake river, which was from 150 to 200 yards wide, and very deep, with high clay banks on either side, and bordered with a slight growth of willow.

He travelled down this river fifty-five miles further, through a similar desert, on the right or west bank, until within five miles of Cantonment Loring, entering a beautiful prairie, with excellent grass and many streams, which continues five miles further to Fort Hall, where he arrived December 13.

The geological formation of the country between the headwaters of the Bitter Root river and the range of mountains separating the tributaries of the Missouri river and its forks from the Snake river belongs to the tertiary period, while that along the Jefferson Fork and its principal tributaries is limestone and conglomerate rock. From the Snake River divide the whole character of the country is changed, the geological formation being principally basaltic and volcanic. None of the streams flowing from the mountains along the route which Lieutenant Mullan travelled emptied into Snake river, but either sank into the ground or formed small lakes in the broad valley of Snake river; while, for sixty miles above Fort Hall, along the main stream of Snake river, there is but one tributary which flows in from the south, and none from the north. The soil generally is fertile and productive, and well adapted to grazing, except for that portion from the Snake River divide to Fort Hall, whose whole characteristic might be described in one word—sterility.

On December 19 Lieutenant Mullan started on his return from Fort Hall northward, over the same route, for twenty miles north of where he had struck Snake river, then more to the east, up High Bank creek, which he followed to the base of the mountains, finding no snow until then, when (December 23) it was three inches deep. The streams were all frozen hard, and there was no game; grass and wood were also very scarce.

On the 24th he encountered a snow storm, the snow falling to the depth of six inches. The thermometer at sunrise was at 3° and only 22° at noon. High up the cañon of this creek there was some cedar, spruce, and aspen, but no timber on the mountains. This cañon was travelled by wagons from Fort Hall to the Bitter Root for the first time, in 1840, by Father De Smet. At nine miles from this stream he struck upon the waters of Hooked Man's creek, a branch of Jefferson Fork, crossing a low ridge with a very gradual slope. There was snow on the summit a foot deep, and in the morning the thermometer was as low as 14° below zero, and ice twenty inches thick on the streams. But, reaching the valley of Jefferson Fork, the snow was only six inches deep, and the animals obtained good grass under it. As he approached Jefferson Fork the snow and ice disappeared, and the weather became so mild as to make fires scarcely necessary. Another beautiful prairie appeared here, twenty-five miles east of Big Hole prairie, before described, and, like it, surrounded by mountains. It was fifteen miles wide, and through it ran the Jefferson Fork, bordered with cottonwood, while the prairie, covered with grass, looked like a great field of yellow grain. Game was here exceedingly abundant, large bands of deer and antelope being seen; and this is the favorite hunting ground of the Indians, the mountains in the vicinity being filled with large numbers of bears, moose, and elk. The Jefferson Fork was here fifty yards wide and two feet deep at the fork.

Lieutenant Mullan found a beautiful country towards the head of the Missouri, not far from the three forks—beautiful and well-grassed valleys that extended far towards the east in the direction of the Yellowstone, and which his guide told him retained the same general character to near the Black hills of Nebraska.

Well-wooded streams, fertile bottoms, mild climate, even late in December, and uncounted herds of game grazing at every point, all tended to form a picture for which he was not prepared, and that showed the capability of the country in the most marked manner.

Near the Jefferson Fork the wooded mountains now gave place to low ranges of rolling prairie hills that lost themselves in the swelling prairies that constitute the great plains of the Missouri and Yellowstone, upon which graze the countless herds of buffalo, and, as he truly

says, "with this region free from snow, the country looked not unlike swelling fields of yellow grain all ready for the reaper's hook."

Passing up a branch of the Jefferson river towards the north, he again reached Wisdom river, about fifty miles east of where he crossed it in going south through Big Hole prairie, and found it here a bold stream, seventy-five yards wide, and timbered with cottonwood in abundance fifty or sixty feet high. Its valley is five miles wide, bounded on each side by high ranges of pine-clad mountains, but the soil is poor, producing chiefly artemisia and cactus. Following up the river for about twenty miles, through a fine open valley, he left it and followed up the valley of a small willow run, affording an excellent road, the valley being from a mile to a mile and a half wide. At the head of the stream he crossed low clay ridges, the last of which formed the dividing ridge between the waters of Wisdom river and Hell-Gate Fork. On the summit there was snow two inches deep, though none appeared in the valley below. Thus, on the last day of December, 1853, he again reached the waters of the Columbia by a pass nearly 70 miles east of where he left them on the fourth preceding. Descending a branch of Hell-Gate river on the first of January, 1854, Lieutenant Mullan entered the long, level, and beautiful prairie called the Deer Lodge, from the great numbers of deer found about it. It resembles that of the Bitter Root valley, but is more extensive, being about fifty miles long and twelve to fifteen wide, bounded on all sides, except the southeast, by high wooded mountains, of which the summits only were covered with snow. Like that, too, it is noted for the slight fall of snow in it during the severest winters, and its many streams are lined with timber. Large numbers of antelope were feeding in it, and mountain sheep and goats were seen on the peaks around. Near its centre is a conical mound (see sketch) about thirty feet high, around the base of which are innumerable springs of hot water, and on top a spring three feet in diameter, down which was thrust a pole twenty feet long without finding bottom. The water from this does not run over the top. A white soft salt is deposited around it.

After crossing Deer Lodge prairie he followed down the Hell-Gate river to its junction with the Bitter Root, and reached Fort Owen on the 10th of January. After the 3d there was a great change in the weather, accompanied by snow, and the streams became frozen over, though not hard enough to bear his animal's weight, and it was therefore not so cold as it had been on Jefferson Fork. His thermometer having been broken, the exact temperature could not be determined.

Thus, in a journey of forty-five days, he had travelled seven hundred miles, crossed the mountains four times, at four different passes, and traversed two sections of country differing in soil, productions, natural features, and general character. In the Hell-Gate valley snow was from four to six inches deep, but in the Bitter Root there was none at all, and it seemed as if he had entered an entirely different region and climate. Garry had pushed the express up Clark's Fork in December, where he arrived early in January. The greatest depth of snow found in the latter part of December and early in January on the route was one foot. Lieutenant Mullan's letter is dated the 12th of January, at which time the Indian started on his return, passing down Clark's Fork from about the 15th to the 25th of January. The greatest depth of snow on the entire route was then a foot and a half.

In regard to Higgins, he went up Clark's Fork in the month of March, finding no difficulty in moving along with horses, having taken the precaution to supply himself with forage, and there was no difficulty whatever on his return trip.

On the 25th of March I had made my arrangements to leave the next day with my report

HOT SPRING MOUND IN THE "DEER LODGE" PRAIRIE OF THE ROCKY MOUNTAINS

for the city of Washington, when early that day Lieutenant Grover arrived, having triumphantly carried out his enterprise of passing over all the ranges in the winter, from the waters of the Missouri to the lower Columbia. The following is the substance of his operations from the date of my parting from him at Fort Benton to our meeting to-day.

LIEUTENANT GROVER'S EXPLORATIONS FROM THE MISSOURI TO THE LOWER COLUMBIA.

The Great Falls of the Missouri are situated about 75 miles by land above the fort.

There are five principal cascades ; the first of twenty-five feet fall, about three miles below the mouth of Sun river; the second nearly three miles below this, of five feet eleven inches; and immediately below it the third. Here, between high banks, a ledge, nearly as straight as if formed by art, runs obliquely across the river and over it the waters fall forty-two feet in one continuous sheet of four hundred and seventy yards in width. Half a mile below this is the fourth, a small, irregular cascade of about twelve feet descent. The stream then hurries on, lashed and churned by numerous rapids, about five miles further, when it precipitates itself over a precipice seventy-six feet high. The banks are high and abrupt on both sides, with deep ravines extending into the prairie for one or two miles both above and below it. Below the falls there is a continuation of rapids, which become less and less frequent, to the mouth of Highwood creek. Steep banks about two hundred feet high crowd closely upon the river, and on the north side are so cut up by precipitous ravines that it is almost impossible to keep near it. But from this to Fort Benton the river bends are longer and there are patches of bottom lands. The soil is good and grass plentiful both on the bottoms and the adjacent high prairies. There is a good supply of cottonwood, and on the Highwood mountains pine timber is easy of access, this being the place where the Fur Company get their building materials. Below the mouth of the Highwood there are no rapids of any consequence to Fort Benton, and the river and its banks much resemble that portion of the stream below the fort.

The Missouri, from the Great Falls to the mouth of Milk river, was surveyed by Lieutenant Grover, travelling in a flat-boat. For many miles below the falls the river flows at the bottom of a cañon, with very abrupt and bare walls, between which it winds, leaving at each detour a small rich interval in the bend covered with luxuriant grass and sometimes skirted by a few small cottonwood trees.

The cliffs are from one hundred to one hundred and sixty feet high.

Passing through the bluffs of the Bear's Paw range, the scenery assumed an entirely new phase. The bluffs were more abrupt and crowded on the river; colonnades and detached pillars of partially cemented sand, capped by huge globes of light brownish sandstone, towered up from their steep sides to the height of a hundred feet or more above the water. The action of the weather upon the bluffs in the background has worn them into a thousand grotesque forms, while lower down their faces seams of rock from three to six feet thick, with nearly a vertical dip, beaten and cracked by the weather, and still protruding for six or eight feet above the softer materials, run up the steep faces and projecting shoulders of the cliffs, looking exactly like stone walls. At a little distance the resemblance to old ruins is striking.

Among these is Citadel Rock, a vertical shaft of volcanic (?) formation, rising about two hundred feet above the water's edge, and standing upon a base of about forty feet square. By climbing up a goat-path he succeeded in getting on top of one of the globes that rested on a short pillar, and in passing from that to some of the others near it. All were nearly of the

same size—between six and eight feet in diameter—and, as far as the eye could detect, were as perfectly round as if they had been turned.

At the foot of the bluffs, and in the small brooks near by, were traces of lignite, and glauber salt had collected by efflorescence on the surface.

Near Arrow and Dog rivers the bluffs recede from the river, leaving wide grazing meadows scattered with cottonwood. An extensive bottom is formed at the confluence of Judith and Dog rivers, which is well wooded.

Below this point the Mauvaises Terres border the river for about twenty miles, presenting a picture of nature's wild deformities, a masterpiece in its way, characterized by a total absence of anything which could, by any possibility, give pleasure to the eye or gratification to the mind by any associations of utility. Not an island nor a shrub of any account; nothing but huge piles of bare mud towering up as high as they can stand and crowding each other for room. The banks varied in height from 200 to 300 feet for the whole distance. After passing this tract the country rapidly becomes more inhabitable. The bluffs are lower and more sloping, and covered with grass; the bottom lands increase in width and richness of soil, while fields of rank grass alternate with thick groves of cottonwood, cherry, and willow.

The larger groves at this season are overrun by bands of elk and deer, which seek the protection of the thickets against the cold autumnal storms.

There are a few scattering pines on the bluffs, and some short, scrubby red cedars.

From Fort Benton to the end of the Mauvaises Terres is 124 miles. The remainder of the distance to Milk river—228½ miles—the face of the country continues to improve, gradually approaching to the appearance of that below its mouth. This trip having been made in September, and at the lowest stage of the river, furnishes important data as to its navigability. For the first hundred miles numerous rapids occurred, only one of which was as shallow as 20 inches, known as Dauphin's Rapid, some miles below the mouth of the Judith. The others were from 23 to 30 inches in depth, and the current on the shoalest was less than five miles an hour. Rocks carried down by ice also form obstructions in these shoals. Below these the only obstacles are sand-bars, snags, and sawyers, such as occur everywhere below.

Lieutenant Saxton, at the same period, made a voyage down the Missouri from Fort Benton to Fort Leavenworth. Leaving on the 22d, he reached the latter point in fifty days, having travelled from below St. Joseph's in a steamer. The keel-boat in which he went was fully loaded, and drew eighteen inches. The distance to Fort Union, estimated at 750 miles by the river, was made in eleven days without the least difficulty.

Lieutenant Grover, after returning from his survey of the Missouri, remained at Fort Benton until January 2, 1854. Up to that time very little snow had fallen there, and it had covered the ground for only a few days at a time. The weather generally had been mild and uniform, and the stock of the Fur Company and of the expedition, without shelter or care, were in fine condition. There had not even been snow enough yet for him to make use of the dog-sledges prepared for his journey across the mountains.

On the 2d he left the fort; and that evening it commenced snowing, and continued stormy for several days, during which about six inches of snow fell. On the 7th he continued on the way with dog-sledges, but by the 9th all the snow was gone, and he was compelled to go over bare ground to near the base of the dividing ridge, where he again met with more permanent

snow. This, on the summit, lay only a foot deep, and continued at the same level all the way across.

This was the commencement of the cold snow storm which overtook Lieutenant Mullan in Deer Lodge prairie. This snow, which was much less in depth on the east than on the west side of the mountains, melted off entirely before he reached Dearborn river, where another snow storm, on January 11, enabled him to reach Cadotte's Pass without difficulty, except from the piercing westerly winds increasing to a gale towards the foot of the dividing ridge. It would appear that the prevailing high winds which blow through this pass are from the west; for, of the many thousand of dead pines that had been prostrated by them, not one did he see that was broken in any other direction than toward the east.

The snow there was eight inches deep, and some of it appeared to have been on the ground some time. About an inch more fell that night.

On January 12 he crossed the dividing ridge. The ascent was steep and laborious, so much so that the men were obliged to double teams and make two turns from the base to the summit, though the distance was not over half a mile.

On the summit, at mid-day, the sun shone brightly in a cloudless sky, and was surrounded by a succession of beautiful halos, apparently produced by the refraction of his rays by minute particles of frost so small as only to be visible in the sparkling of the sun, which filled the air.

The western slope of the ridge was not as abrupt as the eastern. The thermometer stood at 21° below zero, and the cold, assisted by a sharp west wind, froze their ears and noses. The snow was most of the way only a foot deep, and drifted but little.

Severe cold continued on the way down the Big Blackfoot, freezing the men's and dogs' feet severely; and on the 16th, the coldest of the winter so far, the thermometer indicated 38° below zero, at sunrise. This intensely cold weather was not, however, disagreeable for travelling on foot, taking the precaution to rub the nose and ears frequently.

This was only about twenty-four miles from the sources of the stream, and consequently at a very elevated position. As far as the junction of the Hell-Gate and Bitter Root river, although snow fell on the 16th and 21st, it did not exceed eight inches in depth anywhere; and the imperfect freezing of the streams made the frequent crossings difficult, as the trail over the hills was entirely hidden. The weather, though pleasant otherwise, still continued from 10° to 20° below zero. After passing Hell-Gate defile the weather moderated, and the depth of snow decreased to six inches in Bitter Root valley, where he remained from the 22d to the 30th. On the 30th he left Fort Owen on the way westward. From Bitter Root valley to Thompson's Prairie, on Clark's Fork, he found no snow except what he found on the mountain tops. The snow then gradually increased in depth for about fifty miles west, where it was about two feet deep on the average, and remained about this depth to Lake Pend d'Oreille, where it began to decrease, and at the lake was not over one foot in depth. Between this and Lake Cœur d'Aléne it was for most of the way two and a half feet deep, and very hard; but he left it with the dense forest, and, reaching the plain, found the grass fine and the stock in nearly as fine condition as in the Flathead country.

With fresh horses he crossed to Walla-Walla in seven days, arriving on the 2d of March, and having no scarcity of grass at any point. The cause of the deep snow northward is shown by his statement that "the principal feature of the weather, since leaving the Flathead village,

has been its dampness and storminess; scarcely a day passed during the whole time that was entirely pleasant.'' Pend d'Oreille lake was, however, only partially frozen over, with ice eight inches thick on one of its arms.

I repaired without delay to the city of Washington, leaving Olympia on the 26th of March.

Before I rendered my report, which was sent in on the 20th of June, I received from Lieutenant Mullan an account of a trip from the Bitter Root valley to Fort Benton, in the month of March, which established the practicability of taking wagons over the mountains, and showed how small was the obstruction to be apprehended from snow.

LIEUTENANT MULLAN'S TRIP FROM THE BITTER ROOT TO FORT BENTON.

Lieutenant Mullan having learned from the Indians and half-breeds of the mountains the existence of a pass leading directly to Fort Benton, through which wagons could be carried with little or no difficulty, determined upon its examination, and, if practicable, to test it by bringing wagons from Fort Benton to the Bitter Root valley. With this view he started from Cantonment Stevens on the 2d of March for Fort Benton, following the Hell-Gate valley to its junction with that of the Little Blackfoot; thence along the left bank of the Missouri to the Gate of the Mountains, where he crossed the river on the ice, and following along its right bank, reached Fort Benton on the morning of the 12th. He found from twelve to fifteen inches of snow on the main divide of the Rocky mountains, and little or no snow in the valleys or on either slope. He found the route, until reaching the Gate, practicable and easy, but here the road passed over a succession of difficult pine-clad hills that precluded the possibility of a wagon route, save at great expense. The character of the country and the views of the Indians all went to show an easier location to the north, which would turn this detached bed of mountains and reach the foot slope of the divide by easy grades and little or no work. Completing his preparations, he left Fort Benton on the morning of the 14th March, with a loaded wagon drawn by four mules, and keeping on the high plateau near the route of the expedition of the preceding year, he found a level prairie road from Fort Benton to Sun river. Thence to the Dearborn, keeping some miles to the south of Donelson's trail, the route was excellent. From this point, keeping some distance west of Tinkham's route, in fifteen miles he reached the valley of the Little Prickly Pear creek, which was a half a mile wide, and well wooded. Up to this point he had met with no difficulty, but found an easy, practicable wagon road, a measured distance of 124 miles from Fort Benton. Here the fallen timber in the valley of the Little Prickly Pear creek was the first obstacle met with. Selecting a suitable camp on this creek for his party, he set his men to work clearing the timber for a track, which for a short distance followed the valley bottom; but finding, as he ascended the valley, the timber becoming somewhat more dense, which would have involved a greater amount of work and time in its removal than he had at his disposal, he preferred taking the southern slope of a hill, and, gaining the top of a high plateau, to follow this though the longer of the two routes.

In fourteen miles, descending from this plateau, he reached the Prickly Pear creek a second time, which here flowed through a small prairie bottom. This creek rises in the main chain of the Rocky mountains, and flows through two gaps or passes of two low parallel spurs that run northwest and southeast. By following the valley bottom of this creek you avoid all steep ascents and descents, and reach the foot slopes of the main range, the only work required being that of removing the timber and the building one or more small bridges over the Prickly Pear creek.

Gaining a high point of the river, it was seen that for thirty miles above the Gate of the Mountains, from the point where the Missouri breaks through the belt range between the two Prickly Pear creeks, the country is one immense bed of mountains, extending southward along the Missouri to its three forks for one hundred and fifty miles, and fifteen miles wide, making it necessary to range for a road to turn westward and northward of this range or bed. These mountains are mostly well wooded, with an abundant and large growth of pine, and the rock formation is principally granite. In the preceding November Mr. Tinkham had very cold and snowy weather during his journey up this part of the river, but it did not continue, nor interfere with his crossing of the mountains. After the middle of March Lieutenant Mullan found no snow on any part of his route, and had beautiful weather on his return trip from Fort Benton. Even at this early day of the spring the grass in the bottoms was putting forth; and returning with the same animals that he had taken from Cantonment Stevens, they were fat and strong, subsisting only upon the grass found at each night's camp. Wood, water, and grass throughout the whole distance, from Fort Benton to the foot of the divide, was found at suitable and convenient points, a measured line of 150 miles.

From the small Prickly Pear creek to the divide the country was an easily rolling prairie, with occasional strips of timber on either side. On the seventh night from Fort Benton, including the time occupied in the making of the road, he encamped at the foot of the mountains. On the morning of the eighth day he crossed the mountains with no difficulty whatever, found no snow upon their summits, and the divide itself nothing more than a low prairie hill. He says: "Indeed, the ascent and descent were so exceedingly gradual that not only was it not necessary to lock the wheels of the wagon in descending, but it was driven with the animals trotting."

For a railroad line it would involve a cut of one hundred feet deep and half a mile long, which was the measured distance from base to base. He hardly imagined that he was on the waters of the Columbia until he recognized the distinctive and marked features of the valley of the Little Blackfoot. Leaving the divide, he followed down the broad and easy valleys of the Little Blackfoot and Hell-Gate to the junction of the latter with the Bitter Root, finding no difficulty along the whole line. All the streams being easily forded at this season, and the forest being open, with little or no undergrowth, required but little work. For a good and permanent road, to be travelled at all seasons, the bridging of the Little Blackfoot and Hell-Gate would be required at all the present crossings.

In fourteen days from Fort Benton he reached Cantonment Stevens with his wagon—thus proving its complete practicability; and having measured the distance by an odometer, found his line only forty miles longer than that followed by Donelson, through Cadotte's Pass.

In view of the easy grade, the small amount of work required to first put it in good condition for an emigrant line, and to maintain it in that condition, the abundance of grass, wood, and water. and its direct connexion with practicable lines to the east and west, he regards it as the best route he examined in the mountain region.

Mr. Doty, in charge of a detached reconnoitring party, retracing Lieutenant Mullan's steps in July following, remarks of the same pass: "The divide is mainly a high and rolling prairie, the ascent and descent so gradual as to afford a first rate wagon road."

Lieutenant Mullan's barometer having become broken, he was unable to run a profile or give its exact elevation above the sea, but deems an instrumental survey over this pass to be of the

first importance; and it is to be hoped that some future survey over this line will yet supply this important desideratum.

Two views are given, illustrating this trip, one of the Bear's Teeth, a prominent landmark near where the Missouri issues from what Lewis and Clark denominate the Gate of the Mountains, and the other of the Rocky mountains from the Marias Pass, pursued by Lieutenant Mullan.

I left the city of New York on the 20th of September, and reached Olympia again on the first day of December, having been detained in San Francisco over a month by the sickness of my family. On my return I had the pleasure of meeting Lieutenant Mullan and Mr. Doty, who, under instructions sent to them the previous season, had withdrawn their parties from the interior, and were now in the settlements preparing the reports of their labors. As everything bearing upon the feasibilty of the country in the way of communications is interesting, I will say that the instructions under which these gentlemen acted were forwarded to them by express from the Columbia valley, previous to which, however, a supply train, under the charge of Higgins, had been sent there with provisions. On this occasion Higgins started about the month of June. The train moved from the Dalles to Cantonment Stevens in some twenty days, and took a route to the Cœur d'Aléne Mission and Pass, and passing over the great plain of the Columbia on a line crossing the Snake river some 35 miles above the mouth of the Peluse. As he was a man of intelligence and observation, and accompanied me subsequently, I was thus able to verify the general views of the country which I formed.

SUMMARY OF THE LABORS OF LIEUTENANT MULLAN AND MR. DOTY.

The following April Lieutenant Mullan also explored the Flathead river and the country north of it as far as the Koutenay, at the 49th parallel. Leaving the Bitter Root valley on the 14th, he followed the route already used by the main expedition, down Clark's Fork as far as Kamas Prairie, (a sketch of which is here given,) twenty miles below the mouth of the Jocko. Clark's lake was then 250 yards wide and more than fifteen feet deep, so that he had to make rafts to cross it.

Spring was then well advanced, and the prairie covered with long grass. Between it and Clark's Fork, towards the lake, he crossed a low ridge of hills, thickly wooded; reaching Clark's Fork again, at the mouth of Hot Spring creek, he travelled up its west bank. The river banks and the adjoining country, being much cut up by coulées, have the appearance of that on the Upper Missouri.—(See sketch.) The soil is principally a light yellow clay; the stream here is two hundred yards wide, swift and deep, sparsely timbered with pine and cedar, and a few cottonwood and aspen.

From a high point he could see over the country for a great distance, limited to the eastward by a high snow-clad range of mountains, which runs close to the eastern border of Flathead lake at its whole length, and continues on northward to the head of Clark's Fork.

Just below the outlet of the lake there is a series of rapids and falls, one of which, at this season, was fifteen feet high. The country to the west of the lake is a high rolling prairie. Salmon trout, three feet long, are caught in it, supplying one of the principal articles of subsistence to the Indians of the country.

Some distance up the west bank of the lake he had an excellent view of it, (see sketch,) showing that it contained several large and beautiful islands, all covered with an excellent growth of pine. Many of these islands were several miles long. The width of the lake he estimated at eight miles.

BEAR'S TEETH, MISSOURI RIVER

Stanley, Del. after Sohon

Sarony, Major & Knapp, Lith. 449 Broadway, N.Y.

Dearborn River *Cadotte's Pass* *Marias Pass*

MAIN CHAIN OF THE ROCKY MOUNTAINS, AS SEEN FROM THE EAST, – EXTENDING FROM A POINT NORTH OF THE MARIAS PASS TO NEAR THE LITTLE BLACKFOOT PASS

G. Sohon Del.

Sarony, Major & Knapp Lith. 449 Broadway N.Y.

KAMAS PRAIRIE OF THE PEND D'OREILLES INDIANS, IN THE ROCKY MOUNTAINS, LOOKING SOUTHWARD

VIEW OF [illegible] MOUNTAINS [illegible] OF THE FLATHEAD LAKE LOOKING [illegible]WARD

Stanley del.

FLATHEAD LAKE, LOOKING SOUTHWARD.

CROSSING THE HELLGATE RIVER MAY 5TH 1854.

The northern portion of the lake is thickly wooded with pine timber around its shores, and the soil is of excellent quality, but grass is scarce until reaching its end, where there is another broad, level prairie, extending thirty miles to the north and twenty towards the west. Its northern arm was traversed by Mr. Tinkham, on the way to Marias Pass, as already described. Ragged, snow-capped mountains still appeared along its east side, and curved westward far to the north.

Crossing the west fork, called Maple river, (although he could find no maple on its banks,) three feet deep, very rapid, and with a rocky bed, he followed it up to the end of the prairie, partially through a dense pine forest. Above this prairie he passed through an excessively thick forest for a day and a half, reaching the head of Maple river and the summit of the ridge separating it from the Koutenay.

Descending the northern slope the timber was much larger, but not so dense, and the country had a much better appearance.

The country now, again, became a high rolling prairie, which extended along the Koutenay and its branch, Tobacco river, for twenty miles or more. The Koutenay was here four hundred yards wide, flowing through low banks with a gentle current. North of it is a range of pine-clad hills extending to the snowy mountains before mentioned, and towards the northeast these appeared to border both of its banks. The soil along the river was very rich, and covered with luxuriant grass and beautiful flowers as early as April 25. Grass is plentiful at all seasons, and the winters are represented as very mild, while the waters always supply the Indians with abundance of excellent fish. Lead and coal are said to be found on the branches of the river.

Returning southward, he ascended Tobacco river to its sources, west of the range of mountains which border Flathead lake on the west side. Twenty miles south the prairies end, and he again entered the immense pine forest, travelling for forty miles before meeting grass for his animals.

The soil in this forest appeared poor, and on each side of the valley some of the mountains were still capped with snow, though the weather had been very mild and pleasant. At the head of the stream was a fall sixty feet high, the water flowing through high vertical walls of rock, with an impetuous foaming current, and a noise audible for many miles. The cliffs, several hundred feet high on each side, were covered with forest at their summits.

On the ridge were small prairies containing beautiful little lakes, many of them without outlets, formed by the melting of snow on the mountains around. Crossing this, he reached the head-waters of Hot Spring creek, and again traversed a beautiful rolling prairie country along its east side for nearly thirty miles to where he again entered the Kamas prairie, and on the 5th of May arrived at Cantonment Stevens, in Bitter Root valley, without any difficulties except in crossing the flooded rivers, among which, at the Hell-Gate, his whole party and property were nearly lost in using a raft unmanageable in the swift current.—(See sketch.)

Lieutenant Mullan crossed by the Cœur d'Aléne or Stevens's Pass in June, 1854, and reports: "Instead of following the southern trail which you followed, I took the one to the north, and thus avoided the steep and high mountain crossed by your party; and though I found the route much obstructed by fallen timber, yet the character of the country offered no further obstruction to the passage of wagon trains or for a railroad route save the divide itself, which has an estimated height of fifteen hundred feet above the level of the valley, and which from base to base is from a mile to a mile and a half long. The mountain is formed of limestone, schist rock, and friable sandstone. At this point a tunnel from a mile to a mile and a half would be inevitable."

Near the summit of the mountain he found a hot spring, with a temperature of 132°, around which was a fine prairie camping ground.—(See sketch.) Many of the camps were made in the mountain tops, because the river bottoms, being densely wooded, did not furnish grass for the animals of the Indians who had made the route. The valleys, wherever crossed, were rich, and near the western base became interspersed with more prairies.

This route is nearly one and the same as that followed by Lewis and Clark in 1805; the Lou-Lou Fork being their Travellers' Rest creek, and the hot springs referred to are those spoken of by these indefatigable explorers.

Leaving the Bitter Root valley again on the 19th of September, Lieutenant Mullan went down the river to the Lou-Lou Fork, which is fifteen yards wide and two feet deep at its mouth. Its valley is five hundred yards wide, and the mountains on each side are quite high and well timbered with pine and cedar, *(Arbor vitæ.)*—(See sketch.) A good road is found for twenty miles up the stream, partly through prairie and open forest.

Above this the route is over rugged hills to the dividing ridge, which was low and obstructed with fallen timber. On the west side of this he encamped in a prairie two miles in length, through which flows a branch of the Clearwater or Koos-koos-kia. From this point to the main stream of the Koos-koos-kia, a distance in a straight line of sixty-five miles, he was eleven days in travelling, the whole country being one immense bed of rugged, difficult, pine-clad mountains, with many small prairies among them having a rich soil. The route is thoroughly and utterly impracticable for a railroad route.

Among the trees, the white maple, balsam, spruce, mountain ash, alder, and a cherry appear for the first time in these mountains.

On the 2d of October Lieutenant Mullan entered upon the southeastern corner of the great plain of the Columbia, at the point where the Koos-koos-kia emerges from the Bitter Root mountains. Rich Kamash prairies occurred at intervals along the river and its branches for many miles before reaching the open plains, and twenty miles from the edge of the forest a branch of the Koos-koos-kia was crossed, flowing through a deep, narrow gorge in the plain, with perpendicular walls like the other streams westward. An open pine forest, eight miles wide, was crossed further west. In one of the narrow valleys many kinds of vegetables were abundantly cultivated by the Indians with great success. The soil is generally very fertile, and in many places a rich loam two feet deep. The Koos-koos-kia is from 150 to 200 yards wide and two and a half feet deep, with a valley half a mile in width, and flows with a gentle and equal current to its mouth. From the border of the forest to its mouth is about sixty miles. On the evening of the 5th he reached the Snake river and encamped on its banks.

On account of Lieutenant Mullan's route having kept at a distance from the river, towards the north. and along the summits of the dividing spurs, the country in the direction of the river appeared, both to him and Mr. Tinkham, to be only a mass of wooded mountains; yet there is some probability that a large level valley might exist, and be quite hidden from the routes of both, a distance of twenty or thirty miles. The general direction of the branches also indicates a great depression near the principal forks and east of the most westerly wooded ridge, at which their routes converge and come out upon the rolling prairie or plain of the Columbia.

At its mouth the Koos-koos-kia is nearly two hundred yards wide, with high bluffs, and destitute of timber; the water of a deep sea-green color and very deep, the banks showing a rise of ten or fifteen feet at the high stage of water above that of October. Seven miles

Sohon. Del

ENTRANCE TO THE BITTER ROOT MOUNTAINS, BY THE LOU LOU FORK.

Stanley Del.

Sarony, Major & Knapp Lith. 449 Broadway N.Y.

HOT SPRINGS AT SOURCE OF LOU LOU FORK, BITTER ROOT MOUNTAINS, LOOKING WEST

CANTONMENT STEVENS, LOOKING WESTWARD

further down there are several falls and cascades. Between these points and its mouth it has not been crossed or explored by any party of the expedition. On his route westward, about fifteen or twenty miles south of Snake river, Lieutenant Mullan, leaving the river, went up the valley of a small branch called Alpahwah, between high, steep prairie bluffs, its banks bordered with cottonwood, birch, and various shrubs. It is eight or ten yards wide and fifteen inches deep.

The soil, though in places rocky, appeared fertile, and had been cultivated successfully by the Indians and half-breeds, who also possessed bands of cattle and horses. Leaving this stream, he crossed the rolling prairie to a branch of the Tukanon, five miles distant, which has also a similar valley, with steep, rocky bluffs, two hundred feet high and half a mile apart. The stream is of the same size and wooded like the Alpahwah. Ten miles beyond this is the northern branch of the Touchet, separated by a rolling, grassy prairie. Its valley is a mile wide, and bounded by rolling, grassy hills; its banks better wooded than those of any stream met with west of the Bitter Root mountains, and the soil equal to any which had been seen on the route. Lieutenant Mullan reached Fort Walla-Walla on the 9th of October, where he found Mr. Doty, and the Dalles on the 14th, when his party was discharged. He pronounces the trail he passed over the worst of the three he examined, the best being the Cœur d'Aléne trail; Clark's Fork was the third.

Something more, however, is due, both to Lieutenant Mullan and his party and the exploration to which he contributed so largely, than the foregoing narrative of his several journeys. In the establishment of his quarters, the management of his command, and in his intercourse with the Indians, he evinced the soundest judgment, and the whole sphere of duty was filled by him in a manner entitling him to the warmest commendation. I will now give a brief statement of some incidents connected with his post in the Bitter Root valley.

On the 8th of October, 1853, he established his camp ten miles above Fort Owen, at a point where there was excellent grass, wood, and water, and where, in consequence of its being a little removed from the Indian camps, he could better regulate the intercourse of his men with them; and in November, notwithstanding his trip in the meantime to the Jefferson Fork of the Missouri, he succeeded in getting into a state of forwardness the erection of four log buildings for the accommodation of his party, one being a storehouse. Leaving a portion of his party behind to continue the work, he started for Fort Hall, and on his return found the buildings ready for his reception. This was all done by the labor of his own party, the only additional expense being the hire of some oxen to haul logs, and the purchase of hardware, not exceeding in all twenty-five dollars. There was a corral attached for animals. To this post he gave the name of Cantonment Stevens. The accompanying sketch will best describe it. Thus a considerable cost was saved to the government in the way of rent, and there were ample accommodations provided for the use of any subsequent party employed in continuing the work of the exploration, or for the home of an agent sent to the valley to reside amongst the Indians. These considerations were dwelt upon by Lieutenant Mullan in his correspondence with me.

By this time the Indians who wintered in the valley—the Flatheads and some lodges of the Nez Percés—had learned to place implicit confidence in him. I had requested that he should give much attention to Indian affairs, do what he could to impress them with confidence in our government, and especially to devote his energies, in concert with Mr. Doty at Fort Benton, to prevent all difficulties between them and the Blackfeet. The Blackfeet, to be sure, were always the aggressors, and the proposed Blackfoot council, which I had gained the consent

of all the Indians to hold, and which I had so strenuously and so successfully urged upon the government, was, by both, constantly presented to the Indians with whom they were respectively in contact, as the most effectual argument to dissuade, in the one case, from aggression, and, in the other, from retaliating with undue severity.

Lieutenant Mullan, besides his constant and judicious intercourse with the Indians, always assembled them in council previous to starting on any expedition, informed them of his probable absence, and gave them good advice in reference to their own affairs. They were very glad to have him mediate in their disputes, and they cheerfully acquiesced in his decisions. So much solicitude did he feel in regard to Indian affairs, that in his Fort Hall expedition he made it the subject of a special report, which is given in full in volume I of the Pacific Railroad Reports. In that report, (written from Fort Hall,) speaking of the Blackfeet council, he says: "They (the Flatheads) received the intelligence of the council with much joy and exultation, and they now look forward to the coming summer as the time when they are to date a new and happy period in their nation's history." And again: "The report of the council at Fort Benton has spread throughout the whole Indian country as on the wings of lightning, and has been received as a harbinger of glad tidings to all." I received from him, at every opportunity, reports in regard to the Indian tribes, which were of the greatest service, and which enabled me better to comprehend their feelings, wants, and the proper mode of managing them. The fact that he left the valley in the fall of 1854 with the sincere regret of all the Indians who knew or had heard of him, is the best evidence of his services in connexion with them. Not one unpleasant thing occurred during his year's sojourn in the wilderness which marred the propriety of the intercourse of his party with them, or tended to diminish his influence over them.

The individuals of Lieutenant Mullan's party had equal respect for him, and they were generally cheerful and contented, and prompt to perform their duties. Yet the party was at all times on short rations of flour, sugar, and coffee, and much of the time lived exclusively on meat. I received many letters from him referring to the almost entire dearth of articles which, in settled communities, are considered almost indispensable to sustain life, and urging the necessity of despatching a train with supplies as soon as possible. Yet there was no complaint, and his cheerful spirit impressed itself upon all his men. I found it impossible to get off a train in the fall and winter, and one did not reach him till June. Some of the provisions left for him the previous fall were spoiled. He passed through the winter and spring quite well, on the allowance to each man of four pounds of fresh beef a day. The Flathead cattle keep in good order throughout the winter, and no difficulty was found in purchasing beeves at reasonable rates.

I have deemed it a simple act of justice to this most promising and meritorious officer to say this much. His judgment and discretion were equal to his boldness and resource, which qualities had been exhibited not only in his winter explorations, but in those of the spring, when the streams were up and hazardous crossings had to be made. He made remarkable contributions to existing knowledge, both of the snows and the geography of the country, at a season of the year and under circumstances when most men would have done nothing. I left with him, in October, nothing but disabled animals, for every sound one was used in connexion with other parties. The day after my departure he moved his camp to the best grass of the valley, and on the sixth day afterwards he was in his saddle, with a portion of his party, going to the waters of the mission. And such was his promptness and energy throughout.

GREAT FALLS OF THE MISSOURI RIVER

CHAPTER X.

SUMMARY OF EXPLORATIONS MADE BY MR. DOTY AND LIEUTENANT ARNOLD.

Mr. Doty leaves Fort Benton.—Great Falls of the Missouri.—Sun River.—The Rattlers.—Follows the course of Elk River.—Headwaters of the Teton.—Kayiyou, or Southern Branch of Marias River.—Cut Bank River.—Headwaters of Milk River.—Chief Mountain Lake.—Bow Lake.—Both lakes filled with beaver.—Abundance of game.—Mo-ka-un River.—Reaches latitude 49° 30′.—Retraces his route to Marias River.—Moves towards Fort Benton through Teton Valley.—Woman's Breast Hill.—Arrives at Fort Benton.—General Results.—Mr. Doty's trip to the Bitter Root Valley.—Lewis and Clark's Pass.—Follows Governor Stevens's trail to Fort Owen.—Crosses the Big Blackfoot River.—Reaches Cantonment Stevens.—Follows the Hell-Gate and Little Blackfoot Valleys.—Arrives at Fort Benton.—Starts down the river to meet the Company's boats.—Returns to Fort Benton.—Is directed to proceed to Olympia.—Pursues his trail of 1853.—Crosses the Cœur Aléne River.—Cœur d'Aléne Lake.—Peluse River.—Pyramid Butte.—Reaches Walla-Walla.—Crosses the Columbia.—Arrives at Olympia.—Mr. Doty's reports concerning the Blackfeet Indians.—Loss of Meteorological Observations.—No hopes for their recovery.—Governor Stevens recommends to the War Department an instrumental survey of the Snoqualmoo Pass.—His labors as Indian Commissioner among the Indians west of the Cascades.—Mr. Doty makes arrangements to hold councils with those Indians.—Governor Stevens joins Mr. Doty at Camp Stevens on Mill Creek.—General Concluding Remarks of Governor Stevens.—Abstract of Lieutenant Arnold's Report to the War Department.—His Itinerary.—Completes the Military Road across the mountains.—Steilacoom.—Nisqually Plains.—Puyallup River.—S'kamish River.—Mud Mountain.—Green River.—Peak Lête.—Mount Ikes.—View from its summit.—Nachess River.—Wenass Valley.—Yakima River.—Walla-Walla.—Table of Distances by the Odometer, from Walla-Walla to Seilacoom, by Lieutenant Arnold.—Foot Trail from Lake Kitchelus to the head of Snoqualmoo.—Character of the country.—Whole area of the Cascade Range.

Mr. Doty left Fort Benton on May 10, 1854, and travelled up the Missouri near its banks to the Great Falls.—(See sketch.) He crossed a number of deep ravines, and finally coming to some that were impassable, was compelled to go around them. They are narrow, one hundred and fifty to three hundred feet deep, with a steep descent to within fifty feet of the bottom, and for the remaining distance perpendicular walls of red sandstone. A similar cliff occurred on the Missouri, at the falls. Above the falls the banks are low, the soil a light, sandy loam, of considerable fertility, and bears a luxuriant crop of grass. The timber is poor, consisting of small cottonwood. willow, birch, and box-alder.

Sun river at its mouth was then one hundred and seventy-five yards wide, deep. and with a strong current, differing from the other branches of the Missouri lower down in having a broad valley, bounded by hills of easy slope. From the abundance of rain at that season the travelling was very bad in the valley, but he found a good road on the hills.

About thirty miles from its mouth are Crown Butte and the Big Knees, lofty flat-topped buttes, called by the Indians the Rattlers, and prominent as landmarks, indicating the position of Lewis and Clark's, and Cadotte's or Blackfoot Passes, as they can be seen from the Highwood mountains, sixty miles distant. Twenty miles further, cliffs come so close to the river as to compel an ascent to the table-land, which he followed parallel to the course of its north fork or Elk river for about twenty-five miles further. Here the face of the country clearly indicates the approach to a great mountain range. Huge fragments of granite, limestone, and sandstone are scattered over the plain. Out-croppings of sandstone and limestone were noticed with nearly a vertical dip and running north and south. Scattering scrub pines also begin to occur large enough for railroad ties. Still higher up the river beautiful valleys continued, sometimes

two miles in breadth, covered with flowers, and with small lakes, on which were numbers of water fowl.

The valley then narrows, bottoms disappear, and the river is shut in by lofty precipices. Then comes a perpendicular wall of limestone rock one hundred feet high, in which is an opening twenty feet wide from top to bottom, and through this the river flows in a swift, deep current. Its sources were evidently far up in the mountains, and Mr. Doty found it impossible to reach them even on foot, but ascended one of the high peaks near by, from which the view was magnificent. Above and around were snow-covered hills and the breath of winter, while the luxuriant grass and gay flowers in the valley far below were fast approaching maturity under a summer sun. At this high elevation there was still no timber suitable for building purposes.

From Sun river his course lay close along the mountains, over hills of considerable elevation, covered with pines twenty to thirty feet high, through which he had much difficulty in taking the odometer wagon.

The soil continues gravelly and poor among these ridges and plateaux near the headwaters of Teton river, and there is but little timber on the banks of the streams.

Northward of this river, and still at the base of the mountains, the country is a stony plain, intersected by numerous spring brooks, running through deep, narrow valleys, in which the soil is good.

Tracts thickly wooded with scrub pines, and many marshes, rendered travelling slow and laborious; considerable snow was seen May 20, low down in the mountain, and some even in the valleys, but beautiful flowers were at the same time blooming by the side of a snow bank six feet deep.

The appearance of the country still continued to improve in going northward among the branches of Marias river, and the mountains are covered with large pines and firs, while on the river banks cottonwood, birch, and willow reappear. Many small lakes occur from one to twenty acres in extent, clear and deep. The grass was so luxuriant as to form a heavy turf, and the soil a rich loam.

On the headwaters of the Kayiyou or southern branch of the Marias river he found fertile valleys, in which were many small lakes and groves of tall pines, which finally prevented further progress up stream.

Marias river comes through a gap in the mountains some fifteen miles in width, the country around being hilly and densely timbered with pines, but the soil rich, even on the highest hills. There are also many grassy openings or prairies from one to ten acres in extent. The stream was completely hemmed in by perpendicular banks from 150 to 300 feet high, and was swift and deep, so that it was impossible to cross it at this place, but by following it up for several miles a practicable ford was found.

Along this branch an old Indian trail showed that it led to one of the passes across the Rocky mountains. Further north the mountains become more rugged in character, loftier, and covered with snow 300 feet below their summits.

The country is considerably broken by high hills and narrow valleys, by spring brooks, filled with thickets of poplar and willow, and flooded by beaver dams. Several smaller branches were crossed before coming to Cut Bank river, the most northerly tributary of Marias river. This is a rapid stream, fifty feet wide, flowing through a rich valley, with banks of yellow clay

and marl, in some places perpendicular, but generally low and sloping. Upon its headwaters is the pass called Marias, explored by Mr. Tinkham, and a broad lodge trail leading up the valley showed that it was considerably used.

Crossing a range of high hills, Mr. Doty reached the headwaters of Milk river, where the country is quite flat and full of springs and brooks. A heavy forest of pine extends several miles from the base of the mountains, among which, one called Chief or King mountain, is a bare rocky peak, of a square form, standing five or six miles from the main chain, and connected with it by a high wooded ridge.

Seventeen miles further he came to a broad valley, its sides wooded with pine and poplar, (aspen?) and in the bottoms, five hundred feet below, saw the blue waters of Chief Mountain lake. Descending into the valley, in four miles he reached the lake, and encamped on a beautiful prairie bordering it.

This lake is seven miles long, one broad, and very clear and deep, with low gravelly shores. Its valley is six miles in breadth, a rolling prairie, interspersed with groves of cotton-wood, poplar, birch, and willow, in the lower grounds. The soil is a reddish loam, and very fertile, as is indicated by the luxuriant vegetation. Large pine is abundant, and there are inexhaustible quarries of good limestone.

Another lake, called Bow lake, is connected with it, and extends into the mountains nine miles, but has no valley susceptible of cultivation, as the mountains come close down to the water. It was at first supposed that there must be a good pass in this vicinity, but a close examination satisfied Mr. Doty that such was not the case.

Numerous little streams empty into this river, and these lakes are filled with beaver dams, and beaver, elk, moose, and deer, were abundant, and trout of a large size were taken in the lakes.

The outlet of Chief Mountain lake, called by the Blackfeet Mo-ka-un, is a swift, deep stream, eighty feet wide, and having a course for some miles due north. It is the most southerly of the waters of the Saskatchawan, and after receiving several branches forms the principal south branch of that river. Its valley is three miles in width, strong and sterile, high hills bounding it on each side, and the country generally is broken. Twenty-five miles down the stream the country improves, but there is very little timber on the streams, and this ends entirely on its emergence from the mountains.

The exploration ended here, having reached latitude 49° 30′. The boundary line is about ten miles north of Chief Mountain lake, and therefore includes entirely the sources of Marias and Milk rivers.

From the end of the route, looking towards the north and east, Mr. Doty saw a vast plain, or, more properly speaking, a prairie; for in richness of soil, luxuriant vegetation, and bright-colored flowers, it greatly resembles the prairies of the western States. These appeared, however, to be a stretch of fifty miles, destitute of wood.

Turning back on the 8th of June, Mr. Doty retraced his route as far as the Marias, already referred to as issuing through a gap 15 miles wide, and along which was an old Indian trail, and followed it up on the trail for thirty miles to the southwest, finding no obstruction, except from trees; and at that distance, ascending a lofty hill, saw no mountains in the direction of the stream. On each side the mountains were lofty and rugged, showing, generally, perpendicular

rock from within 300 feet of their summits, which were covered with snow; and snow banks were also found on the north side of many hills. It is to be regretted that Mr. Doty did not continue on, and ascertain where the trail issued on the western side of the mountains.

This is the true Marias Pass, described by the Little Dog to me at Fort Benton in September, 1853, and formerly used by the Indians in crossing the mountains.

From here he moved off toward the southeast, directly for Fort Benton, by the valley of the Teton river. The country now became a vast plain, descending towards the east, the soil of inferior quality, and the dry vegetation indicated the change in the climate observed in going over these high, dry plains towards the Missouri. At the same time, heavy showers were occurring in the mountains; but two passed over him, giving only a few drops of rain, though the thunder and lightning were terrific. But on June 13, twenty-five miles from the mountains, a severe storm of rain and hail fell in torrents, covering the valley of the Teton to the depth of four inches. This portion of the valley he describes as of no use for farming purposes, and the yearly fires will soon consume every stick of wood.

Here is the hill, some two hundred feet high and perfectly resembling a woman's breast, from which the river derives its name, called by the Blackfeet Mone-e-kis. This hill is visible from a long distance.

Below this point the valley, for more than 125 miles to Fort Benton, was well timbered with cotton-wood, covered with luxuriant grass in the bottoms, and the soil appeared rich, being still very soft from recent heavy rains. At the middle of June vegetation was in its highest state of perfection, the ground covered with brilliant flowers of the cactus and lily, and the air perfumed with the scent of roses.

Mr. Doty reached Fort Benton June 19, and found the Missouri full, nearly level with its banks, which appeared like a mighty stream in comparison with the little streams he had crossed. The general results of his reconnoissance were a thorough exploration of the Missouri, along the base of the Rocky mountains, to the parallel of 49° 30′, carrying a correct odometer measurement to the boundary; discovering the sources of the Sun river, Breast river, Marias river, Milk river, and their branches, and also Mo-ka-un, or Belly river of the north, and their general characteristics; ascertaining the existence of a large body of agricultural land, and proper localities for farms, and the general capabilities of the country for settlement, and collecting specimens in geology, natural history, and botany. Three hundred and twenty varieties of flowers, many of which, it is believed, are new to the botanist, were collected and carefully preserved. The barometrical observations were continued as far as Badger river, when the barometer was broken. Observations were taken for latitude, and the distances ascertained by the odometer. Unfortunately the specimens were not forwarded down the Missouri, as directed by Mr. Doty, and on my return to Fort Benton all the botanical specimens were moulded and useless.

Mr. Doty now remained at Fort Benton till the 8th of July, when, with Mr. Burr, who had brought him my instructions, transmitted through Lieutenant Mullan, to remain in the country till further orders, and with two men, he started on a trip to the Bitter Root valley. Following the trail pursued by me in 1853, till within ten miles of the divide, he then changed his course to Lewis and Clark's Pass, and struck the trail pursued by Mr. Lander, and continued on it, crossing the divide, till he came upon my trail again, some 12¼ miles west of Cadotte's Pass. He followed on this trail to Fort Owen, except that seven miles before reaching the lower cañon of the Big Blackfoot he turned to the left, and in six miles crossed that river, and

passing through open pine woods for five miles, came out upon a beautiful prairie, four to ten miles in extent, having a rich soil of black loam, covered with luxuriant grass, and which is known as the Kamas Prairie of the Flatheads. Passing through scattering pines of large growth and small prairies, he struck the Big Blackfoot at a shallow ford only six miles from the junction of this river with the Hell-Gate. He crossed the ford, when his route continued the same as that of the main train. This cut-off saves some very bad side-hill travelling along the Big Blackfoot. Reaching Cantonment Stevens, he remained five days, and he describes the Bitter Root valley as one of the most charming spots he ever beheld; as, in truth, a paradise.

On his return he followed the Hell-Gate and Little Blackfoot valleys, moving on the trail over which Lieutenant Mullan had taken a wagon the previous March. He found the high water trail on this route not so favorable for a pack train as that in the Big Blackfoot, and reached Fort Benton July 30, having made the distance, both ways, in seventeen travelling days. On the 15th August he started down the river to meet the company's boats.

Returning to Fort Benton he found my instructions of June 2, from Washington City, again despatched as before, through Lieutenant Mullan, by the hands of Mr. Burr, directing him to proceed to Olympia. On the 7th September he was on the road, but was delayed in consequence of endeavoring to drive oxen too fat for the journey over to the Bitter Root, and was at length compelled to abandon the undertaking and to send them back to the fort. He pursued essentially his former route, and after making the necessary arrangements with Lieutenant Mullan, at Cantonment Stevens, he left on the 19th September, pursued my trail of 1853, over the Cœur d'Aléne mountains to the Cœur d'Aléne mission, and then separated from my trail to take one more direct to the Walla-Walla, south of Cœur d'Aléne lake.

Crossing the Cœur d'Aléne river about sixty miles east of the crossing of the main train, and above the lake of the same name, he passed through prairie for four miles, south of the river; he then ascended a high ridge for a mile and passed over a rolling country, with scattering pine timber, seven miles, to a stream flowing into the lake and running through a fertile valley.

Leaving the south end of the lake, he went up a narrow valley, up a gently rising slope, for four miles, and ten miles more through rolling country, sparsely timbered with pine, little undergrowth, and plenty of grass. Then came a large prairie, stretching away towards the west beyond view; its soil being a black sandy loam. South of this is another high ridge, of six hundred feet elevation, and an easy ascent for a mile. From its summit the plain was seen towards the west and south, bounded only by the horizon, and the distant spurs of the Blue mountains. Several small streams run from the foot of these ridges to the west, forming by their junction the south branch of the Cœur d'Aléne.

For twenty-two miles to the southwest of this ridge he met neither wood nor water, though he crossed the dry bed of a stream at about half that distance, striking the main western branch of the Peluse, which is thinly bordered with pines, cotton-wood, and willows; it was there twenty feet wide and one foot deep, flowing over a pebbly bottom. The soil of its valley is a rich loam, the valley narrow and bordered by basaltic precipices. Forty-nine miles further, keeping more to the west, he struck the Peluse four miles above its mouth. The longest interval between water was eighteen miles, and the country gradually becomes more broken and rocky, in following down the stream from the north. A branch was crossed fifty feet wide and two feet deep, with a valley like that of the other branches.

Just north of the first branch of the Peluse is a lofty hill, called Pyramid Butte, towering high above the prairie.

Mr. Doty now followed the usual trail to Walla-Walla, which he reached on the 7th October. Here he was unable to procure guides to cross the Snoqualmoo Pass; for he was instructed by me to observe for altitude and carefully carry the railroad line down from that pass to the sound, and, as his barometers were broken, he concluded to follow the emigrant road over the Nachess Pass. Crossing the Columbia on the 11th, the next day he started, and reached Olympia on the 24th of the same month.

Besides his explorations, Mr. Doty made several reports on the Blackfeet Indians, and acted as their agent during the whole time he was among them. He visited their winter posts on the Milk and Marias rivers, during the winter of 1853. By the measurement of several hundred Indians, taking them indiscriminately, he found the average height of the adult males was about five feet eleven inches.

We had the great misfortune to lose nearly the whole bulk of our meteorological observations, which, in charge of Lieutenant Donelson, on his return from Olympia to Washington City, were placed in the hands of the express company for safe transportation, and were lost by them on the steamer. It is sufficient, for the vindication of the exploration, to say that every means was taken to recover them. As I have frequently observed, the observations were exceedingly numerous, not only those by Mr. Moffett and his assistants, moving with the main train, but of Mr. Tinkham, Mr. Lander, and others, in side work. Often there were twenty or thirty different observations on and off the route; for, to the extent of the force, every effort was made to get positive and fixed data for an approximate location of the road and determination of the whole amount either of excavation or embankment required for its grading. Lieutenant Donelson, in his anxiety to get the observations, very cheerfully complied with the orders of the War Department to repair to San Francisco in search of them. I met him at Acapulco, on his return to the States, when all hope of recovering them had to be abandoned.

While in the city of Washington I urgently pressed upon the War Department the continuation of the survey, and particularly an instrumental, properly speaking, survey of mountain passes found, by reconnoissance, to be most practicable. Especially did I dwell upon the importance of the instrumental survey of the Snoqualmoo Pass, and of carrying the line down to the sound. With the ordinary instruments used in exploring parties the work is simply that of reconnoissance, and, excepting some few mountain passes, which had been carefully levelled and the direction properly taken with the more refined instruments of engineers, there had been and have been no instrumental examinations of any of the routes. On my return to Olympia, and on possessing myself of all the information which had reached me subsequent to my leaving the city of Washington, I became the more impressed with my duty to urge this matter upon the department; and when I relieved Lieutenant Mullan from duty and directed him to report at the city of Washington, I urged his being assigned to the duty of going up the Missouri with the party for the Blackfeet council to be sent from that side, in order to carry a line of levels from Fort Benton westward, to examine certain routes deemed by him, and by me, to be, probably, practicable and feasible, and thus, while gaining additional information, to get a new line of observations to replace those which we had so unfortunately lost. I will remark that all the observations of the eastern party were lost, except those of Lieutenant Donelson up the Missouri, and those made at the winter posts at Fort Benton and Cantonment Stevens.

It is not my intention to do more than simply refer to my duties as Indian commissioner in connexion with its bearing upon a knowledge of the country. During these winter months,

especially January and February, I made treaties with all the Indian tribes of the sound, and held councils with all the remaining Indians of the territory west of the Cascades, except those of the Cowlitz and Chehalis rivers, and thence to the mouth of the Columbia, which enabled me to get a large amount of information in regard to the character of the country, and especially of its capacity for settlement, for the question, Where shall the reservation be established? made this information an indispensable necessity in order to arrive at just and sound conclusions.

Whilst these operations were going on west of the Cascades, in the way of making treaties, Mr. Doty was moving among the tribes east of the Cascades, in order to make arrangements to hold councils with them. This took him to the Yakima country, into the Walla-Walla valley, and to the Nez Percés country, where we held councils with the various tribes, each in its own country, and where the arrangements under my instructions were made that all should assemble at their old council and peace ground in the Walla-Walla valley. The goods for this council were sent up the Columbia river in keel-boats, they having been wagoned to the mouth of the Des Chûtes, and thence taken up the river. This may be said to have been the commencement of the navigation of the upper Columbia with keel-boats; and so practicable is the Columbia in this respect that the main bulk of the supplies for the Walla-Walla post during the past two years have been taken on the line of the river in sailing vessels carrying from forty to sixty tons burden. No difficulty whatever has been found in running up in all the rapids, and the trip has been made from the mouth of the Des Chûtes to old Fort Walla-Walla in twenty-four hours.

About the middle of May, 1855, I started from Olympia, and moving rapidly to the Walla-Walla, joined Mr. Doty at Camp Stevens, on one of the tributaries of Mill creek, on the 21st day of May, 1855. The account of my subsequent explorations (which is simply a continuation of this exploration) I have denominated the narrative of my explorations in 1855; but this narrative I will conclude after some general remarks.

It did not seem advisable to the War Department to order a continuation of these surveys, nor have I ever complained that such continuation was not ordered and placed in my hands. It was unquestionable that a considerable sum had already been expended, and if the information which I had furnished was deemed decisive and controlling in favor of the question of railroad practicability, or if the due allotment of the appropriation had been assigned to the northern route, it was wise and just to apply the subsequent appropriations to points where the question was still doubtful, or which had not received their proper share of attention. I only regretted that, as it was admitted that the question of the snows of the Snoqualmoo Pass could only be settled by actual admeasurement, a winter post at that pass was not established in order to procure reliable information. When the time comes for building the railroad over this northern route, the engineers will then make this examination if they are not satisfied that the snow is not an obstruction. They will make the instrumental survey of the Snoqualmoo Pass to the sound, because it is a question of the saving of some 130 miles over the route by the Columbia and the Cowlitz. If we look to how railroads have progressed in this country, particularly to the earlier roads; if we look to present projects now being carried into successful execution, we shall be convinced of the truth of this observation. On some of the old lines of railroads, simply to improve grades a little and to get a better location for depots, the old track has been replaced by a new one, sometimes for one-quarter of the whole length of the road; in some cases there not being an interval of a mile between the two tracks at any point. This is the case with the Boston and Maine railroad. But when grades are eighty feet and more.

engineers and business men have deemed it expedient to open other lines where the grade could be reduced, even if it involved costly and excessive tunneling. This is the case in Massachusetts. The Great Western railroad of that State, coursing along its southern border, and having its terminus at Albany, has grades of eighty feet or more; and now along the northern border of the State they are tunneling the Hoosac mountain as long, probably, as any tunnel on the northern route, in order to get the grade down to sixty feet, and to open another connexion between the waters of the Hudson and those of Massachusetts bay, at a saving of distance of only forty miles. These instances might be multiplied almost indefinitely, and they show precisely what our people will do when they come upon the work of our great overland communications.

I had taken, however, the precaution to order from New York some barometers, and to get suitable supplies of drawing materials and stationery, with the view, as I reported to the department, of availing myself of every mode to gain a knowledge of the country.

And in submitting the following report of my explorations of 1855 it is but justice to myself to say that the whole of it was done without any pecuniary assistance whatever, except the payment of the purchase referred to. It was done and with great personal exertion, as extra duty by myself and the two gentlemen with me, without causing the delay of the train for a single moment or the hiring of a single additional man. And thus did I gain facts which tended to verify the accuracy of the general results in the way of altitude in 1853; for I happened to have in my possession the copy of the preliminary computations for altitude, as derived from the barometrical observations; had it not been for this, I would not have my data even for publication in regard to profile. The profile itself was drawn in Olympia previous to my departure.

It will also be observed that Mr. G. W. Stevens, who had brought the portable transit through on the backs of animals from Fort Benton in 1853, had a little observatory made at Olympia, where he determined the latitude of that point. This young gentleman was of great promise, but to the affliction of all his friends he was drowned in the Skookum-Chuck in February of this year. He was my private secretary, and I had been exceedingly anxious that he should have an opportunity of resuming employment on the survey, and of going over the country to determine carefully the geographical positions. From causes already adverted to, our results for longitude were not reliable.

I had forgotten to mention, in the proper place, that Lieutenant Arnold, who, under my general supervision, had relieved Captain McClellan from the charge of the military road from Fort Steilacoom to Fort Walla-Walla, executed the duty greatly to the satisfaction of the people and of the emigrants who went over the road, as well as to the satisfaction of the department. From his report to the War Department I give the following brief abstract and itinerary of his route.

LIEUTENANT ARNOLD'S LABORS.

In 1854 and 1855 Lieutenant Arnold completed the military road across the mountains by the Nachess pass, which had been commenced by the citizens of the Territory, and by Captain McClellan's party in 1853. He thus reports on the nature of the country as it appeared to him in early summer :

Leaving Steilacoom, on the shores of the sound, the road crosses a tract of open prairies about ten miles in length, and nine in width, a part of what is known as the Nisqually plains. These plains are interspersed with beautiful lakes and scattered groves of timber, mostly oak and fir, the former of which must be of great value for ship building and other purposes at

some future period. The soil throughout is generally gravelly, except along the borders of the creeks, where it is black loam, the best proof of the richness of which is that every acre is settled upon.

From the plains it passes through thick timber for six miles to a high ridge bordering the valley of Puyallup river, which forms the limit of the gravelly district. This valley is from two to four miles wide, lying, like those of the Nisqually and Whitewater, between high perpendicular bluffs, and covered with a heavy growth of timber, consisting of arbor-vitæ and spruce, and with thick underbrush, chiefly willow and vine maple.

The soil is rich but somewhat sandy; above the crossing the stream forks, and is made up of many tributaries, along the banks of which large prairies are found, capable of a great yield to the agriculturist with little labor.

The Puyallup, fordable except at the highest stage of water, is generally about one hundred feet wide, and two and a half feet deep at the ford.

Leaving this bottom, the road passes alternately through small prairies and timber to Whitewater or S'kamish river. This stream is a perfect torrent, fordable only three months in the year, and even then the force of the current and exceedingly rocky bed renders the transit with the pack animals and wagons both difficult and dangerous, particularly for emigrant stock that have crossed the plains and Rocky mountains.

One of the most striking peculiarities of this stream is the milky color of the water, due probably to some earthy substance found along the northeastern side of Mount Rainier. Beyond this crossing lies a succession of fine prairies for seven miles, after which there is no grazing to near the summit of the mountains.

The soil bordering the river, including the prairies, is wet, though elevated, consisting of a mixture of clay and vegetable mould, which retains the moisture of the winter rains until near midsummer. With this exception, few sections offer greater inducements to the settler, and none surpass it in fertility.

From the last prairie the road passes over a high hill, very appropriately called Mud mountain, the soil being similar to that of the prairies. A thorough examination of this mountain was made, but high perpendicular bluffs running to the river, and a complete network of fallen timber, left no choice but to follow the location of the previous year. The greater part of this tract was made passable by a series of heavy cedar bridges. Descending again to the river, the road continues up the valley, making six crossings, which cannot be avoided except by heavy side cutting, and in many cases blasting; but in the event of another appropriation he strongly recommends that they be avoided.

Leaving Whitewater the road enters Green River valley, and, with the exception of a short distance where there are cañons, continues through it to the mountain. This deviation involves two hills, the highest fifteen hundred feet. Here, as well as along Whitewater, he says he should have made more improvements but for the important obstacles still to be encountered. The appearance of this valley is like that of Whitewater, but in approaching the mountains the ranges rose higher and gradually closed in, forming near its head a continuous cañon, and necessarily involving seventeen crossings. The river has an average width of forty feet, with a gentle current, and the bottom generally rocky. It can be forded whenever the road is passable.

Near the junction of Whitewater and Green rivers there is a remarkable peak called La Tête, from a large rock on its slope resembling the head and neck of a man. This is an important point, as it forms the gate of the mountains on the west.

Four miles beyond the only prairie above the forks is found, and would afford some grass for passing droves but for the numerous bands of Indian horses constantly crossing here. He strongly recommends sowing two or three hundred acres here with grass seed, as the woods around were burnt off many years since.

With the exception of the trails mentioned, the entire valleys and surrounding heights are studded with a dense growth of timber, mostly fir and spruce, with some hemlock, and now and then a pine, and the ground is covered with fallen trees, from four to six feet in diameter, and from one to three hundred feet in length. In many instances he noticed thrifty trees, three or four feet through, growing upon others much larger, which had fallen, and which, upon inspection, proved perfectly sound. This will give some idea of the amount of labor expected throughout this distance.

The ascent from the valley to the mountains was originally an unbroken slope of thirty-three degrees, and probably one of the most difficult in the country. This he reduced to a practical grade. Other steep slopes followed, many of which were graded, but the amount of money at his command did not allow him to do as much as he wished.

On the summit the mountains spread out towards the south, forming an extensive flat, filled with ponds, interspersed with prairies, and in other places covered with a dense but small growth of timber. The road skirts four prairies in the distance of two miles, which afford excellent grazing and an abundance of fine spring water.

Under the most favorable circumstances this part of the route will not be passable for wagon trains more than five months in the year. On his first reconnoissance (about the 28th of May) he found four feet of snow for five miles, and in many places from six to ten feet. On his return, after the completion of the work, the last of October, he found from one foot to eighteen inches of snow along the summit, thus showing that the interval was within five months for that year.

In crossing, about September 12, in 1853, Lieutenant Hodges encountered a slight fall of snow, but it did not remain, for emigrants, crossing several weeks later, found none in the pass, and none fell until the third of November, and then only to the depth of four inches.

Near the dividing ridge is situated Mount Ikes, about 5,100 feet above the sea, from whose summit he obtained a magnificent view of the surrounding country, extending beyond the sound to the west, and on the other sides limited by the mountains and their spurs.

To the south Mount Rainier appeared in all its majesty at a distance of fifteen miles, and towering far above him; to the east was the valley of the Nachess; to the north, the serrated volcanic (?) range near the Yakima Pass, and the beautiful ridge bordering that river on the north.

The eastern slope of the mountains was very favorable, and required comparatively little work. Descending from the mountains, the road crossed Nachess river, a beautiful stream, about twenty feet wide at the ford, having a gentle current and rocky bed, and entered a most picturesque valley. High ranges, in some places forming steep, perpendicular cliffs not less than 2,000 feet high; in others, graceful slopes covered with a luxuriant growth of bunch grass and thrifty timber; rapid mountain streams, forming at their mouths islands covered with groves; and the numerous rivulets traversing the prairies that border the river, make the scenery particularly striking when compared with the cold and dismal forests of the western valleys.

Vegetation matures much sooner on the east than on the west side, showing that the snows must melt much sooner.

The road crosses and recrosses that stream forty-four times; then crosses a ridge to the valley of the Wenass, with an ascent of about 800 feet; but from Captain McClellan's observations this might be avoided by following down the valley of the Nachess to its mouth. Four miles below the Wenass is the first ford of the Yakima, which, during the travelling season, is there about one hundred yards wide, and not over eighteen inches deep in midsummer.

From this ford to the bend of the Yakima there is barely a sufficient supply of water along the road, except at stated camps, and at them it is disagreeable and injurious, being strongly impregnated with sulphur.

Fuel for cooking purposes is also very scarce, but there is abundant grazing. Near the mouth of the Yakima is an excellent point for a recruiting camp for emigrants coming from the east. The remainder of the route to Walla-Walla is over the level sandy bottom bordering the Columbia for seventeen miles.

Lieutenant Arnold urgently recommends that an additional appropriation of ten thousand dollars should be made, which will give the work a permanence and stability that it justly demands.

Distances measured by the odometer on the military road from Walla-Walla to Steilacoom, constructed by Lieutenant Richard Arnold, 1st lieutenant 3d artillery, United States army.

	From point to point.	From Steilacoom, eastward.
	Miles.	*Miles.*
To Puyallup river	22⅛	22⅛
To first crossing of Whitewater	9¼	31⅜
To last prairie on Whitewater	6⅝	38
To second crossing of Whitewater	11⅞	49⅞
To sixth crossing of Whitewater	5⅝	55½
To La Tête	3¾	59¼
To first crossing of Green river	1⅞	61⅛
To Bare prairie	2⅜	63½
To western base of mountains	10¼	73¾
To first prairie on the summit	3⅝	77⅜
To last prairie on the summit	2⅛	79½
To first crossing of Nachess river	5⅛	84⅝
To crossing of Papat valley	10⅝	95¼
To mouth of Bumping river	4¼	99½
To last crossing of Nachess river	11¾	111¼
To Wenass river	10	121¼
To turn off from Wenass valley	16	137¼
To first crossing of Yakima	4	141¼
To water in crossing bend of Yakima	18¼	159½
To 2d water in crossing bend of Yakima	7½	167
To Brackish spring, (undrinkable)	16¾	183¾
To Yakima, below bend	18¼	202
To Yakima, near mouth	15¼	217¼
To end of road, opposite Walla-Walla	17¼	234½

There is a foot trail leading from the head of Lake Kitchelus to the head of the Snoqualmoo, forming the true Snoqualmoo Pass. The Indians represent this as practicable on foot with the greatest difficulty, and that it is seldom used. In Mr. Tinkham's winter examination, the Indians who accompanied him reported this pass to be better and more free from snow than the Yakima Pass, but more obstructed by fallen timber, and therefore impracticable with horses.

About May 15, 1856, Captain Smalley crossed this pass and found snow only for two or three miles—the greatest depth being four feet.

On June 20, 1856, Major Van Bokkelen went up Snoqualmoo river from the falls, 35 miles, passing through prairie for five and a half miles, and the rest through forest greatly obstructed with timber. After passing the summit he lost the old Indian trail, and going for ten miles southerly by compass found another, and four miles further reached Lake Kitchelus. As this trail ended at the lake, he was obliged to force his way along its western shore for eight miles over rocks and timber, and at its lower end reached the foot of the Yakima Pass. The Indian trail passes around the east side of the lake. The whole ascent of the west slope is by a gradual rise.

Some of the country on the western slopes of the Cascade mountains has a ready been described in the account of the routes across the Klikitat and Snoqualmoo Passes. This description will apply to all that lying among their western spurs, as far as at present explored. Since the period of the expedition the surveys of the Land Office, and reconnoissances by various parties of the Washington Territory volunteers and others, have given to these districts even a more favorable character than might have been expected. Though the greater portion of the mountain spurs are covered with a dense forest of gigantic growth, there are along all the rivers, and at conveniently short intervals, prairies varying in extent from one to ten square miles, with the most productive soil, and offering to the pioneer farms already made to his hand. They must thus serve as a nucleus for the commencement of settlements, and can support a very numerous population until its increase and the gradual consumption of timber requires the cultivation of the equally rich forest lands. Many, indeed, have already preferred to clear lands in the forest, and found it more profitable than to occupy prairies at some distance.

Descending to the valley bordering Puget Sound, the Nisqually, Upper Chehalis, and Cowlitz rivers, we come to a vast extent of nearly level country, in which prairies are much more numerous and extensive, and where also the wooded bottom lands and often the uplands are all cultivable and valuable. This tract has a length, north and south, of 250 miles on the meridian of Vancouver; and allowing it only thirty miles of width, in order to allow for the water surface of the sound and for occasional mountains, we have an area between the Cascade and Coast mountains alone of 7,500 square miles, or 4,800,000 acres. This constitutes the valley of the Territory, and is continuous with the famed Willamette valley, of Oregon, which it quite equals or exceeds in productiveness. One-third of this may be estimated as prairie, though much remains to be explored.

Forming an outlet to this on the west is the Chehalis valley, fifty miles long, passing through the coast range and continuing in a width averaging fifteen miles—480,000 acres. In the Willopah valley there are about 103,680 acres, and as much more level land along the coast, making, exclusive of the Columbia valley, 5,487,360 acres of level land between the Cascades and the ocean.

The Columbia, below the Cowlitz, presents to the traveller the appearance of having much less valley than it really possesses. High mountains of the Coast range rise very near its banks,

but there is a wide bottom land of good soil almost everywhere; and the upland consists, in a great degree, of tables, which, though thickly wooded, are, from their location along this mighty river, more valuable than might be suspected. Their rich stock of timber is easily got into the river and the soil left behind is generally of superior quality. No prairies occur on the Columbia below Kathlamet, except those called tide-lands, near its mouth, which only need embankment and drainage to make them cultivable. In the estimate only such lands are included as are at once ready for occupation.

When a population has been established requiring more than 6,500,000 acres for their support, besides the products of trade in the lumber and other products of the country, as much more land lies west of the Cascade range, which by that time will be made accessible and even more valuable for agriculture than what is now presented. The whole area of land west of the Cascade range may be estimated at 18,480 square miles.

NARRATIVE OF 1855.

CHAPTER XI.

WALLA-WALLA TO BITTER ROOT VALLEY.

Circumstances of the exploration.—Walla-Walla Valley.—Touchet Valley.—Tukanon River.—Louis Moragné.—Pyramid Butte.—Lawyer, Head Chief of the Nez Percés.—Divide separating Snake from Peluse River.—Kamas Fields.—Coeur d'Alène Mission.—Stevens' Pass.—St. Regis de Borgia River.—Itinerary and minute description of route between Coeur d'Alène Mission and Bitter Root Valley.—Chiefs of the Pend d'Oreilles and Flatheads.—Indian Treaties.

These explorations were made under the following circumstances: I had received the necessary instructions, and was clothed with proper authority to make treaties with the Indian tribes throughout the Territory of Washington; and I was also one of the commissioners for holding the Blackfeet council, which I had so long and so strenuously urged upon the government, and for which I had been preparing since 1853. James Doty, esq., the gentleman in charge of the winter post at Fort Benton, and who had crossed the country to Puget Sound in the fall of 1854, was available for service in this duty of making treaties with the Indians. A most intelligent young man, Albert H. Robie, who, from a cook boy in 1853, had, in a year and a half, become an intelligent herder and woodsman, was also desirous of being engaged on this service. In January Mr. Doty was sent with a small party east of the Cascade mountains, to make the necessary arrangements for bringing the Indians together in council. A large quantity of goods were to be taken to the Walla-Walla, which was finally agreed upon as the council ground, at the instance of Kamiakin himself, who, in open council, said to Mr. Doty: "There is the place where, in ancient times, we held our councils with the neighboring tribes, and we will hold it there now." The goods for the council were taken to the Walla-Walla in keel-boats; and this may be regarded as the commencement of a kind of navigation which, at the present time, has been succeeded by the running of sailing vessels carrying sixty tons freight, and by the launching of a steamer, which will soon ply from near the Dalles to Old Fort Walla-Walla, and probably some distance above. I also secured the services of a very intelligent, faithful, and appreciative man, Gustavus Sohon, a private of the 4th infantry, who was with Mr. Mullan the year previous in the Bitter Root valley, and had shown great taste as an artist, and ability to learn the Indian language, as well as facility in intercourse with the Indians. His services I secured, as interpreter, through the intervention of General Wool. I was well provided with barometers, forwarded to me by James Green, esq., of New York. Thus, in the month of May, 1855, I found myself in the Walla-Walla valley, with instructions to go to the Missouri, and with the means, by proper care and management of time, and a little hard work, to make a good examination of the country. My secretary, James Doty, esq., assisted me in the topography, and G. Sohon made the barometrical observations. This is not the occasion for me to dwell upon my operations in making treaties with the Indians. It is sufficient for me to say that they have been much misunderstood, and have had many aspersions cast upon them. At a proper time I am prepared to vindicate every step of my course, and to satisfy all men of honor and disinter-

estedness that those treaties are entitled to the consideration and the confidence both of the government and the people of the country; but my present business is to give that narrative and account of my explorations which will throw light upon the character of the country. So, not making any remarks about the great Walla-Walla council, great both in the fact that many tribes and large numbers of Indians were present, and that it had a potential influence in preserving the peace of the country, we will move forward on our way to the waters of the Missouri.

On Saturday, June 16, we left our camp in the Walla-Walla valley at noon, moving over a delightful rolling country, well grassed and arable, to the waters of Dry creek, a tributary of the main Walla-Walla; and on June 17 we moved twenty miles over a remarkably fine grazing and wheat country, and camped on the Pa-at-ta-ta-creek, a branch of the Touchet river.

The following points of to-day's journey are worthy of attention, in order to show that this region is not the barren desert it has been represented to be. In six and a half miles we crossed the Smahine creek of the Touchet, where there was good running water. In three miles and three-quarters further on we crossed the Kapyah creek of the Touchet, near its junction with the latter stream. There was pine in view in the valley of the Touchet, and the country was very beautiful and inviting. One mile further, on a small fork of the Touchet, several persons have taken claims in the vicinity, and four miles further on we struck the valley bottom of the Touchet. The descent was somewhat steep, but the bottom was wide, and there were pine and other trees in the valley. The whole country in view was well adapted to purposes of agriculture and stock raising. In three and a half miles beyond we crossed the Touchet, passed over a very low prairie divide, and in one mile and a half we came to the Pa-at-ta-ta, which we crossed, and encamped on the right bank. This stream falls into the Touchet one mile below where we first struck it.

Monday, *June* 18.—To-day we made twenty miles and a half, and camped on the right bank of the Pa-at-ta-ta, a tributary of the Tukanon. The following points are worthy of attention. The first ten and a half miles are over a very fertile and rolling country, bringing us to the crossing of the river. The bluffs or hills, on our course, bordering the Tukanon, are somewhat steep, while the valley itself is not wide, but has a very fertile soil. There would be no difficulty in laying a wagon road through the depression of this valley, over which very heavy loads could be taken.

Leaving the Tukanon, we ascended the bluffs and passed over table-land of the same character as that of the first portion of our journey, and reached the Pa-ta-haha tributary of the Tukanon. This tributary furnishes a large amount of excellent land; its valley, as well as the table-land between it and the adjacent streams, is uniformly fertile, and at the present time covered with the most luxuriant grass. I will here remark, to guard against misconception, that it must not be inferred, when I speak of a country as being covered with excellent grass, that it is not an arable country, for I suppose it will be admitted that all arable countries ought to furnish grass of some kind. After travelling up this stream three miles, we came to a rather broad trail which, turning off from the stream crosses Snake river, eighteen miles below the Red Wolf's ground, and leads to the Cœur d'Aléne Mission and the Spokane country. Continuing up still further, we made our camp on its banks, in a beautiful grove of cotton-wood, with excellent grass. The day's journey has been delightful to all the members of my party, for it passed over a most beautiful prairie country, the whole of it adapted to agriculture. In the valley of the Tukanon we found a very experienced and kind-hearted mountaineer, Louis Moragné, who, with his Flathead wife and six children, had gathered about him all the comforts

of a home. His eldest daughter was married to a very intelligent American, Henry Chase, a native of my own county, in the good old State of Massachusetts, and they now proposed to locate on the Touchet.* Moragné left St. Louis in 1831, served some years in the employ of the American Fur Company, then went to the Bitter Root valley, but left there in consequence of difficulties with the Blackfeet. He is the owner of some fifty horses and many cattle. His potatoes were in blossom, and his wheat excellent. He had four acres under cultivation. He succeeded well in raising poultry, of which he had three or four dozen. The salmon is taken in the Tukanon river, and high up on the Blue mountains, at its source, are found elk and deer.

Tuesday, *June* 19.—We made to-day fifteen miles; crossed the Snake at the Red Wolf's ground, near the mouth of the Alpawaha creek, and camped on its north bank, the grass being entirely adequate to the sustenance of our animals, though not so luxuriant and abundant as at our previous camps. I will call attention to the following points of this day's journey. We continued up the creek, on which we camped, for two miles, at which point we left it, there being higher up the creek, directly in view, abundance of fine timber. Continuing on, in four and a half miles we reached the divide separating the waters of this tributary from the Alpahwah creek. This divide is, strictly speaking, scarcely a divide, for the whole country is table-land; but as far as we could judge, there not being water near to it, it was the highest point of our trail. Here we had a most excellent view of Pyramid Butte lying some distance north of Snake river, of which we took the bearings. To the southeast the great gap of Snake river was in view. Three miles further on, gradually descending, we struck a branch of the Alpahwah, the water, however, being only in pools. In one mile we struck the main Alpahwah, which comes in from our right, and in four miles we reached its confluence with Snake river. Here, according to previous appointment, we met Lawyer, (the head chief of the Nez Percés,) Red Wolf, and Timber Tail; and here I completed my arrangements in regard to the delegation which this powerful and friendly tribe were to send to the Blackfoot council. At the Red Wolf's ground was a fine field of corn, which promises a most luxuriant crop. I estimated the amount under cultivation at twenty acres. It was irrigated by the waters of the Alpahwah, and was tolerably well set out with fruit trees; while I observed with great pleasure that men as well as women and children were at work in this field, ploughing and taking care of their crops. The corn planted only seven weeks since was about to silk out. From the appearance of the valley of the Alpahwah, I am satisfied that grapes would be a very profitable crop. The whole country is exceedingly well adapted to grazing, and especially to wool-growing. I will refer the reader, who is anxious to understand this country, to the narrative of Lewis and Clark, both in regard to the character of the country and of the Indians. I have sometimes thought, while travelling, as I have to-day, over the route of Lewis and Clark, that it was a work of supererogation to do anything more than simply to quote their narrative. They speak of the soil of the country on this day's route as fertile. The Indians, too, are about as avaricious, with all their other good qualities, as they were in their day, as we had abundant reason to know from the difficulty with which we made a bargain to ferry our animals over Snake river.

We had for supper this evening a salmon—few, however, are taken in this portion of Snake river. The water is deep, and the Indians never resort to seines or weirs. They take salmon in the night by floating down the river in a canoe and using a dip-net or a spear. Higher up the Snake river, and especially on the Koos-koos-kia tributary, salmon are taken in great quantities, particularly at certain points on the road to the Flathead country.

At our camp we were visited by Lawyer, who gave us much additional information about his tribe and the character of the country. The Nez Percés country is exceedingly well adapted to grazing, and is for the most part a remarkably fine, arable country. There are very extensive fields of the kamas, and the Indians lay up large stores of that nutritious and delightful root.

Wednesday, June 20.—We moved twenty miles to-day and camped at a delightful spring, with abundant dry wood near by. The first two miles and a half we went down Snake river. An Indian camp was in sight, on the right bank of the river, one mile below, and another on the left bank of the river, two miles and a half below our camp. The Indians were collecting their horses to go out to the kamas fields northward of Snake river. We then moved up a small tributary of the Snake—the water, at the present time, at the lower portion of it, being simply in pools, or running short distances—and in four miles reached the table-land; water, wood, and grass being abundant the last two miles. And here I was astonished, not simply at the luxuriance of the grass, but the richness of the soil; and I will again remind the reader that it does not follow because the grass is luxuriant that the country is not arable. In a mile and a half we reached the divide separating the waters of the Snake from those of the Peluse, which divide, so far as the eye could reach, is nearly parallel to the Snake, and about four miles from it. In two miles and a half we came to a long and narrow lake; fields of kamas being in view for a long distance. There is running water in the lake, which, however, from time to time, sinks into the ground and rises again. Three miles and a half further we came again to running water, with luxuriant cotton-wood. This connects with the lake before referred to, and here is a most excellent camping place. In a mile and a half, again, wood and water. In two miles and a half we came to a low divide, and in two miles more reached our camp. On our left we saw bands of Indians digging kamas, some three miles distant, who were afterward ascertained to be twelve lodges of Peluses, under their chief Quillatose. I will again say, we have been astonished to-day at the luxuriance of the grass and the richness of the soil. The whole view presents to the eye a vast bed of flowers in all their varied beauty. The country is a rolling table-land, and the soil like that of the prairies of Illinois.

Thursday, June 21.—We moved to-day seventeen miles, and encamped at the right bank of the main Peluse river. At our last night's camp the pines of the spurs of the Bitter Root were in view, extending to within a mile or a mile and a half of us. We skirted along or passed through these pines during this day's journey. The whole country to the westward, as far as the eye could reach, was an open plain, the skies clear and the atmosphere transparent; I say again, the whole country was, apparently, exceedingly rich and luxuriant. I interrogated very closely my pack-master, Mr. Higgins, in reference to the character of the country westward, for he had crossed it on two different lines between our present trail and that from the mouth of the Peluse; and he assured me that the country which my own eye saw to-day, and had seen yesterday, was precisely the same country as that found on the westward lines. Pyramid Butte was also in view to-day, as it had been yesterday. We took its bearings with a view of laying it down upon our map.

But to resume: in 3¼ miles we reached the extensive kamas grounds of the Nez Percés. Here were six hundred Nez Percés—men, women and children—with at least two thousand horses—gathering the kamas. So abundant is this valuable and nutritious root, that it requires simply four days' labor for them to gather sufficient for their year's use. In 2¼ miles further on we struck the great Nez Percés trail, coming from Lapwai, a much larger and more used trail than the one we had followed from Red Wolf's ground. In one mile we came to water and cotton-

wood; pines were seen to the eastward of us, about a mile distant. In $3\frac{1}{2}$ miles we crossed a divide covered with pine. A most excellent camp is to be found one mile before reaching this divide. In $4\frac{1}{2}$ miles, passing over a rolling, well grassed, and arable country, we reached a second divide, also covered with pine; and in two miles more we made our camp on the Peluse. Between the two divides a trail branches off to the Spokane country. The kamas grounds on our route are watered by several tributaries, which flow into the Teenat-pan-up branch of the Peluse. Before descending into the valley of the Peluse, I ascended a very high hill on the last divide, and westward of our trail, where I had a most distinct and interesting view of the sources of the Peluse.—(See sketch.) So much was I impressed with it, that I directed Mr. Doty to carefully take notes and lay down the river on his map. It has its source in the main ridge of the Bitter Root, sixty or eighty miles distant from the hill where we observed it, and flows in nearly a straight course through a valley some twenty miles wide, bearing north 77° east, through a country densely timbered with pine. There is probably a pass to the Bitter Root valley, by the line of the Peluse. I will remark, again, that the country in this day's travel has been of the same general character as that of yesterday. The bottom land of the Peluse has great resources. It is very heavily timbered with pine, with but very little underbrush; and the country throughout is open, the grazing being most admirable. We had a view down the Peluse for some thirty or forty miles, and the timber was apparently as large and abundant at the lower end of the valley, as at our present camp. Many trees are to be seen three and four feet through, with a proportionate height.

Friday, June 22.—We made to-day eighteen miles, and camped in the celebrated Kamas prairie of the Cœur d'Aléne, and on the river of the same name. In seven miles we came to a spring with abundant wood, one mile before reaching which the trail joined us which leaves the northern tributary of the Tukanon, as stated in the journal of June 18. In five miles further we crossed a divide covered with pine; and two miles further on, came to a small stream which afforded a good camping place. In two miles further crossed a low divide, and in half a mile came to running water, affording a good camp. In half a mile further we came to a delightful spring surrounded by a grove of cotton-wood, with pine near at hand; and in one mile came to running water on the Cœur d'Aléne kamas grounds. At these kamas grounds there were twenty-five lodges of Cœur d'Alénes, and about 250 Indians, who visited our camp and gave us information about the Cœur d'Aléne Indians and the country. The chief and his principal men agreed to meet me at the mission. Towards evening we were visited by Slyotze, one of the Peluse chiefs, and some twenty of his men. His camp consisted of eleven lodges and 137 souls. Four lodges more were down the Peluse, and ten men, women, and children were at the falls of the Peluse. In conversation, Slyotze expressed his own and his people's satisfaction with the treaty. They regarded Kamiakin as the head chief of the Yakima nation, and the Peluses as a tribe of that nation.

Saturday, June 23.—To-day we moved $18\frac{1}{2}$ miles, and camped at the Guts of the Cœur d'Aléne lake. The first four miles took us over a rolling country to a very large spring on the left of our trail surrounded by cotton-wood; three miles further we passed by a spring on our right; in two miles crossed the divide between the waters of the Cœur d'Aléne prairie and the Cœur d'Aléne lake and river; and in six and a half miles we came to a limpid and abundant stream of water near the foot of a low divide, which was very heavily wooded. In a mile and a half we struck the lake, passing down a rather steep hill; and continuing along its borders a mile and a half more, we crossed what is known as the Guts of the Lake, and made an excellent

Stanley. Del. after Sohon

Sarony, Major & Knapp Lith. 449 Broadway N.Y.

SOURCE OF THE PELUSE

camp on the other side. Here the good effects of the arrangements we made last evening with the Indians showed themselves. The chiefs and principal men, who had agreed to meet me at the Mission, reached the crossing before my party did, and had the canoes in readiness to take us over.

The narrative of these last four days' travel shows how extraordinarily well watered the country is west of the spurs of the Bitter Root mountains. I will state again, having crossed this great plain of the Columbia from the Chemakane Mission north of the Spokane to the mouth of the Peluse, that the difference in the character of the country on these two lines is most extraordinary. A large portion of the country, from the Chemakane Mission to the mouth of the Peluse, is arable, and is generally well grassed. There is no deficiency of wood for camps, yet occasionally the basaltic formations crop out of the ground, at which points the country is sterile and uncultivable. But under the spurs of the Bitter Root mountains the whole country is arable, the soil as rich as the best prairies of Minnesota, and every convenience for the house and farm at hand—water, wood for fires, and timber for building.

Sunday, June 24.—The St. Joseph's river, on which we camped, is larger apparently than the Cœur d'Aléne. For several miles it has a very sluggish current, and is quite deep. It furnishes unquestionably a route to cross from the Bitter Root mountains to the Bitter Root valley, which has been used by Father De Smet and others of the Jesuit missionaries. Father Ravalli, however, has not been able to give much information about the river. But to resume our day's journey: we made fifteen miles, and I put the main party into camp on the Cœur d'Aléne river, and continued on myself to the Mission. In a mile and a quarter we crossed the St. Joseph's river, keeping up the right bank of which for three miles brought us in sight of the former Mission, half a mile from the St. Joseph's, on a most beautiful point of land, with springs of water and abundant wood. The country here was exceedingly well grassed; and although somewhat rolling, it furnishes every advantage for agriculture. Continuing on for five miles further, over the rolling country between the St. Joseph's and the Cœur d'Aléne, we reached the lake, and in five miles more came to the lower crossing of the Cœur d'Aléne river, and encamped on its right bank. On my way to the camp I learned that Colonel Crosbie, whom I had sent to Colville on business connected with the treaties, had anticipated me a day at the Mission, and he had the forethought and precaution to have boats sent to the place where I camped my main party, in order to relieve the animals, who have a somewhat boggy road to pass over to reach the Mission to-morrow. With Mr. Doty and Mr. Sohon I rode to the Mission that evening, and met two of my old voyageurs, Antoine Plant and Camille, who had with them specimens of gold which they had found on Clark's Fork, some forty miles above its mouth. I learned that an assistant of Dr. Evans, Girardin, had been sent down on an express to Mr. MacTavish, chief factor at Vancouver, with information about the gold, and to get instructions and confer in regard to the measures which should be taken to secure to the Crown and the company the mineral wealth north of our parallel.

We were received at the Mission in the most cordial and hospitable manner, and remained there the next day. To show something of the privations which the missionaries have to undergo, I will remark that Father Ravalli, in his recent trip from the Dalles, had the assistance of only two Indians and an Indian boy in bringing up a train of twenty-two pack animals. He was obliged to see personally to the packing of each one of his animals, doing most of the manual labor himself, and could not get off (though he commenced at early dawn) until towards ten o'clock in the morning.

COEUR D'ALÉNE MISSION TO STEVENS'S PASS.

Tuesday, June 26.—Before starting—for I remained at the Mission until about two o'clock to-day—I had a conference with the Indians in regard to their own special treaty arrangements, and about sending a delegation to the Blackfoot council. It will be sufficient to state here that the conference was entirely satisfactory to all parties; and bidding adieu to our hospitable host, we moved eleven miles to a large prairie, where my party encamped in October, 1853. The road was for the most part very easy to-day, except that in coming into the prairie there were some wet places. The grass is uniformly good, and although the immediate valley of the Cœur d'Aléne is not wide in any place, yet the hills slope back very gently, making it an open country. A rain came on about midnight, and I remained in camp here the two following days. On Wednesday a Flathead from the Bitter Root valley joined our camp, and gave us information in regard to the several tribes of that nation. Everything was quiet, and all were looking forward to the council.

Friday, June 29.—This morning was clear and delightful; but the rains of the two previous days had made portions of the road muddy and the crossings of the streams difficult. We met the superior of the Missions of this country and two other gentlemen of the party returning from the Bitter Root valley. where they had gone to inspect the Upper Pend d'Oreille Mission. The following is the itinerary of to-day's journey. We made in all thirteen miles. The first half mile we crossed two sloughs, and in half a mile further we reached the largest cedar that I ever saw in the Territory—some twenty feet in diameter. Continuing up the bottom half a mile further, we take a side hill, which we pursue for three-eighths of a mile; crossing then a small stream, and sometimes on side hills and sometimes in the valley, we at length reached camp. Without going into details of this route with more particularity, I will observe that there are a number of good camps, with excellent grass, and firewood plentiful everywhere. We crossed the river sixteen times in to-day's journey. The ascent of the valley was very gradual, in almost a straight direction, presenting no sharp curvatures and no obstacles either to the construction of a wagon or railroad; and the river crossings would be no obstacle to a railroad, because the water does not rise more than three or four feet above its present level.

Saturday, June 30.—We made fourteen miles to-day, and camped on a little tributary of the Cœur d'Aléne river, about one mile above its junction with the latter stream. In five and one-half miles from camp we reached the foot of the mountain which is referred to in my trip of 1853; but I resolved to keep up the river itself. I have already referred to this route as having been pursued by Lieutenant Mullan last year, who described it as exceedingly eligible either for a wagon road or for moving with pack animals. His general account of the route was exceedingly accurate, and the trail presented more advantages than I anticipated. After leaving the foot of the mountain a mile and a half, we made our seventh crossing of the Cœur d'Aléne to-day, in a cedar swamp, easy in this season of the year, but very muddy soon after the melting of the snows, where considerable work would be required for a wagon road. For the remaining distance to camp we crossed several streams of water, occasionally keeping on side hills or over rolling ground; but no obstacle of a serious character presented itself for any structure which the wants of the people might require. The hills occasionally have a steep pitch, but are low; there is generally very fine grass on our route, and abundant water; and here we came to fine limestone, which was scattered about in blocks. Plenty of fine timber in the valley of the Cœur d'Aléne in view to-day. Nor will there be any difficulty on account of freshets. In this portion of the stream the highest water is only about four or five feet above its present level.

On reaching camp this evening Mr. Doty, Mr. Sohon, and myself, followed down the little stream on which we were to its junction with the Cœur d'Aléne river. There I took a barometrical observation, and observed the river carefully. I will observe that on starting yesterday morning I sent ahead a small pioneer party, consisting of two of my best voyageurs, to open the road, which was somewhat obstructed by fallen timber. One of the peculiarities of travelling in a wooded region is, that to get along comfortably with a pack train you must send a party ahead to clear the track of the fallen timber. The two men who were put upon this duty kept the track clear and were not joined by the train until they reached camp.

STEVENS'S PASS.

Sunday, July 1.—To-day we crossed the mountain and camped on the St. Regis de Borgia, our day's journey being fifteen miles. Starting from camp, we moved three miles over the same rolling country as described in yesterday's journal. The grass was very plentiful and luxuriant, and water in clear and limpid streams every mile or two until we reached, four miles further, a cedar swamp on the banks of the Cœur d'Aléne river, through which we passed, and occasionally pursuing our course over very low side hills, coming to the river. from time to time, through a country wooded. open, and arable, we finally reached the crossing of the Cœur d'Aléne, and began the ascent of the mountain. Looking up the valley of the Cœur d'Aléne from this point of the crossing, which was seven miles from our camp of last night, I observed that the valley was quite wide and open, and from what I had observed of the stream on the other side two years since, it seemed to me probable that there would be found no difficulty here in tunnelling for a railroad. We had, in the course of the morning, taken quite a number of barometrical observations, and we continued these observations until we reached our evening's camp. The western ascent of the mountain was somewhat steep. Although I carefully observed the whole country and found that, as regards a wagon road, I could lay one on gentler slopes than the slopes on the great national highway between Jalapa and Perote. This hill was 5,000 feet above the sea, and on its top and sides was a very heavy growth of timber. There was coarse and luxuriant grass over the mountain side—not choice food for animals, but which they eat very readily in the winter. The eastern descent of the mountain was more easy than the western; but the valley of the St. Regis de Borgia, in its upper portions, was more narrow and less practicable than that of the Cœur d'Aléne. I found, however, that in every portion of this valley there was room enough to lay a wagon road or a railroad; to form embankments and to make excavations without filling up the valley or obstructing the course of the water—a consequence to be very much guarded against in narrow mountain valleys. In examining this and other valleys I have sometimes seen that sustaining walls would have to be used instead of embankments of earth, there not being sufficient room for the latter arrangement. On reaching camp I found a Cœur d'Aléne express, whom I despatched some days since to the Bitter Root valley with instructions to Mr. Adams in regard to the Flathead council. Mr. A. informs me that the Indians are all ready to assemble; that he will have his camp established six miles below Hell-Gate; that everything is quiet in the Indian country, and that the Indians are all full of the Blackfoot council.

ST. REGIS DE BORGIA RIVER TO CROSSING OF BITTER ROOT RIVER.

Monday, July 2.—To-day I moved sixteen miles and a half, and made a most excellent camp, with grass, wood, and water, as good as one could desire. The great feature of to-day's travel was the constant crossing of the St. Regis de Borgia river. I took the precaution to note every

crossing, and to observe and record the time occupied in moving from crossing to crossing, and was able, therefore, to estimate the distances with considerable accuracy. All down the valley are little spots of grass; it is, for the most part, wooded, but furnishes camping grounds for small parties. The difficulty in moving with a large party would be, that the animals would scatter in the woods a good deal; they would have no difficulty in getting plenty of grass to eat, but it would be somewhat troublesome to hunt them up and have them in readiness in the morning. This, I say, is the main difficulty of moving with a large party. Were the woods burned on a part of this route and grass seed sown, it would be as fine a route as I ever saw. Without going into very careful details, I will state that we crossed the St. Regis de Borgia thirty-nine times to-day, in no case, however, going over side hills to an extent to make a perceptible rise in our route. The low bluffs and hills immediately bordering the valley were not more than twenty or thirty feet high, and in every case they run back gently, covered with heavy pine, spruce, and larch, with occasionally a cedar. All the country adjacent to the valley is rich and arable. The heavy forest trees and cotton-wood on the streams furnish the most abundant material for the building of little settlements, and for railroad construction. I will here state that when I crossed in 1853 my health was exceedingly delicate, and I was not able to make that close and careful observation of the minute points of the country that I have been able to do on this present trip. Now, in regard to the crossings of the river, they were in every case easy fords. The stream was in no case more than from two to two and a half feet deep, and we made thirty-nine crossings without wetting a pack. The banks of the river were generally from four to twelve feet above the present water level, which is only three or four feet above the highest water. Throughout the day's journey excavations and embankments would be very moderate. There was a great quantity of limestone on the route to-day, as well as yesterday. Speaking of the building materials—when I crossed over the mountain route in 1853 and ascended the highest peak, which my friend Doty the subsequent year named after me, I saw vast quantities of limestone. Some three or four mountain peaks within twenty miles of me were, apparently, masses of limestone, and from the appearances of the out-croppings of that peak on the route, I am satisfied that the finest quarries of limestone and marble will be found; but the detailed examination of such matters belonged to the geologist, and I had not time to wait a day to make a minute examination.

I observed to-day that in the crossing of the St. Regis de Borgia it would not be necessary in any case to resort to bridges requiring piers. Many of the crossings, however, would have to be very oblique to the course of the stream, in order to preserve the greatest possible directness in the line of the road and avoid sharp curvatures; yet, in every case, it would simply require abutments and a single arch or truss. There would be a good deal of culvert masonry on the route to-day; but in most cases dry walls will answer every purpose, and only occasionally will walls of masonry have to be resorted to for culvert work. I examined the river, also, in regard to drift, and found very little on its banks, another fact showing how light the freshets of the stream are; for it must be observed that occasionally there occurred on the immediate line of the stream heavy timber, with thick underbrush, presenting the only difficulty we had in moving with pack animals, and the cause of our crossing the stream so often.

Tuesday, July 3.—We made sixteen miles to-day, and camped on the main Bitter Root. Although I had not in my train quite one hundred animals, yet they got scattered somewhat in the wood, and we were rather a long time in collecting them. But I saw that they were well filled, and in a condition to make a good day's march. We continued down the river, passing over the same character of country as yesterday. Luxuriant grass occurred every mile or two.

Leaving it at a point where there was a very fine bed of limestone, and continuing up a small tributary which flows in from the left, we reached the beautiful prairie where, in 1853, I made my noon halt and got some fine venison, as well as a salmon trout, from a little party of Indians. We now continued on, passing over a high hill, from whose top we got an exceedingly good view of the surrounding country. We could discern the general course of the valley of the St. Regis de Borgia, and the several connecting tributary valleys, each furnishing its water to the main stream. Our course thence to the Bitter Root river was mostly through an open wooded country, in some cases very well grassed, the whole of the country arable, and the hills gently sloping, the country not being as broken as one would have anticipated. We made our camp one mile below the mouth of the St. Regis de Borgia, finding the Bitter Root river not fordable; and it was obvious that it would be necessary for us to construct rafts the following day in order to cross it. The ford at this point is one requiring care to take a train over at the very lowest stage of the water, which is in September and October. Animals should be led over this ford, for it is in a very oblique line in relation to the general course of the river. Entering the ford from the west side you continue well down the stream, following a shoal or sand bar. If you go a little to the right or left you get into deep water; but in the fall of the year the water would simply come up to the packs. The next morning all the men were at work constructing rafts, and, with Mr. Doty and Gustavus Sohon, I went to the mouth of the St. Regis de Borgia to make observations for altitude and to examine the banks of the stream. The country here, for a mile each side of the river, was low, not more than from one to three or four feet above the highest water of the spring freshets. Occasionally I observed a slight depression in the ground, where the water would rise some few inches; and I saw that it allowed of laying a railroad line down the valley, making such a crossing of the Bitter Root as would give good lines of direction and avoid sharp curvatures.

Wednesday, July 4.—We were engaged this day in making the crossing. Three rafts were constructed. I went over on the last raft with Mr. Higgins, our packmaster, my son, and some of the best voyageurs of the party, and it was with great difficulty that we made the other side, for our raft was rather unwieldy; we did not make a good start, and came very near being swept down by the current. But we succeeded in making the other shore, established our camp back on the bluffs, and had everything prepared to move in the morning. In the vicinity of our camp the country seems to consist of slightly rolling table-lands, and, as far as I could judge from the appearance of the country and from the information which I could gain from the Indians, I am satisfied that the country generally between the Bitter Root river and the Flathead river, whose junction forms Clark's Fork, is mostly cultivable table land. I paid particular attention to the forest growth, and I bore in mind our Puget Sound experience, which had established the fact that the timber lands, as a general thing, were much superior to the prairie lands. When I first went to the Puget Sound country, in 1853, that fact was not acknowledged; but the popular impression was that the timber lands were worthless except for the timber. In 1855 there had been experience of crops on timber land, which established conclusively the fact that they were our most valuable lands for agricultural purposes.

CROSSING OF BITTER ROOT RIVER TO HELL GATE.

Thursday, July 5.—My camp of last night was two and a half miles below the mouth of the St. Regis de Borgia. We did not get off until 11 o'clock, and, travelling seven hours, we made our camp on a small creek watering a rich and large prairie, with the most luxuriant grass we had seen since leaving the great plain of the Columbia. On arriving opposite the

St. Regis de Borgia I found that a railroad or wagon road down that stream should take its right or southern bank, and thence cross the Bitter Root. The banks of the Bitter Root, on both sides, are exceedingly favorable to such a crossing. They are only six feet above the present water level on the left bank, and eight feet on the right bank. The highest water is five feet above the present level, and the lowest water is about three feet below; so the greatest rise and fall of this stream at the mouth of the St. Regis de Borgia is eight feet. The river is 150 yards wide, which width is preserved throughout to-day's route. The regimen of the river is very uniform, the banks not abraded in the slightest, and, with one exception, hereafter to be noticed, no shelving of the banks has occurred. I noticed particularly the growth of forest trees on the side hills throughout to-day's and every day's march on my present journey, and from their appearance I saw that for at least one hundred years there had not been a shelving on the route. The Bitter Root river, like all mountain streams, has a somewhat sinuous course; yet the smallest curve required in a railroad line through its valley to the mouth of the St. Regis de Borgia has a radius of 2,000 feet.

It may be well to give the details of to-day's journey with some little particularity. From opposite the mouth of the St. Regis de Borgia, for a mile and a half the road follows a plateau some eight to twelve feet above the present water level; then for three-quarters of a mile it runs along side hills, generally low, not requiring much excavation and embankment, and with gentle curvatures. I observed at this point that the engineer had the choice of routes; he could either follow along the river bank, or lay his course somewhat inland, and it is only by careful location that the relative advantages of the two could be determined. Then for three-eighths of a mile you pass through a prairie with gentle curves; one-eighth of a mile side hill work again, but very slight; at the end of this distance there is a point of land running to the river, which must be cut through. For one mile and seven-eighths the route is on a plateau slightly undulating, to the extent that it is sometimes ten and again it is forty feet above the river level, but excavations and embankments slight. The curves are so gentle that for this portion of the distance the line is equivalent to a straight line. At this point there is a good crossing of the river, but it is not essential to make the crossing; on the contrary, the road should keep along the present bank. For one mile and three-quarters more we follow a plateau from ten to twenty feet above the water level. At the end of this distance are two spurs which come near to the river, affording room, however, for a road, with very moderate excavations and embankments. For one mile more we come on a plateau twenty feet above the river level, very uniform in its character and in a gentle re-entering. The excavations and embankments are very moderate here. For one mile further still we keep on the bank of the river. Hills come down near the river, but there is no rock excavation, and earth excavation and embankment are both moderate. For three-quarters of a mile more we still keep on the river bank, when we come to the only difficulty on the road. Very high, steep bluffs stretch along the river for 350 yards. No trees grow on the sides of the bluffs. It is impossible to lay along this bluff either a wagon road or a railroad by excavations of earth. The route must make this portion of the river by a peculiar construction hereafter to be described, or you must lay the course well back. From what I could see of the country I thought there would be no difficulty in doing so, but I cannot speak positively as to that. At the end of these river bluffs, that is, at 350 yards, I observed that the banks were very firmly fixed, both from the appearance of the grass and from here and there a tree growing. No change could have occurred in them for many years, probably not for a hundred years, and the structure to be resorted to is the following: There will be no difficulty in building heavy

abutments and in throwing an arch along the line of the river from the northern to the southern end of this bluff, and therefore a heavy bridge structure along the bank of the river will enable you to pass these bluffs. It would require but a single arch; so whenever the bank shelves again it will pass under the arch, and it may do so repeatedly without interfering at all with the structure. In one quarter of a mile from the end of these bluffs we come to a creek which will have to be bridged, and in a quarter of a mile further we come to the plateau. This last half mile will require some side cutting. We then continue for three miles and three-quarters over an open prairie, with a somewhat hard soil, better adapted to grazing than farming, and which can easily be adapted to grades. At the end of this distance is a fine mountain stream which must be bridged. The whole distance is in a large re-entering. An almost straight line can be laid all through this distance. The prairie is characterized by plateaux, which run obliquely to the river, and which will have to be handled with some little care in order to reduce grades, as well as excavations and embankments. I will here observe, speaking of these plateaux, that in a careful examination of the country, simply with reference to its practicability for a railroad line, they hardly come into the account at all; they are simply matters of detail; and I have gone into these details with great particularity on the present occasion, because in 1853 I reported in regard to this route difficulties which, on a review of the route in 1855, I found to be much exaggerated. In one mile there is a slight change of level, for the plateau rises twenty feet, but the road should still keep on the river side. For one mile further there will be some side cutting for half the distance. In three miles and a half, gaining gently from the last distance the prairie of our camp, we lay the road in a straight course. Here is a fine prairie of two to three thousand acres of excellent grass and watered by several streams. Our route to-day enabled us to view the opposite side of the river. Half a mile before reaching camp a stream flows into the Bitter Root from the opposite side, and three miles and a half before reaching camp a larger stream flows in. The first stream is about one-half and the latter stream about three-fourths the size of the St. Regis de Borgia. I will observe that just after leaving camp this morning we met a Flathead Indian, with a note from Mr. Adams, saying that the Indians were patiently waiting for my arrival. The Indian was sent back with a note saying that I would be there the next day.

Friday, July 6.—Before entering upon the details of this day's journey I will state that, on leaving my camp on the right bank of the Bitter Root river, I pushed forward with a small party, leaving our packmaster, Higgins, in charge of the supply train to come up a day later than myself. It was always a favorite plan with me to have a trustworthy man in charge of the train and animals, and let him have his own way, under general instructions, so as to leave me free to devote my whole time to the examination of the country. Starting from our morning's camp, three-quarters of a mile takes us to the end of the plateau, where the river can be crossed to a plateau on the opposite side; but continuing on this side one-eighth of a mile further involves side hill work, with a curvature of two thousand feet. For a mile and one-eighth further the plateau is from thirty to seventy feet above the water level of the Bitter Root; but a grade of forty feet could be adjusted to the ground without heavy embankment. For two miles more the plateau is still generally followed. Two bridges in this distance will be required to cross mountain streams. The excavation and embankment for this distance will average about six feet. Five-eighths of a mile further on we come to somewhat difficult work; the banks are bluff, presenting steep natural rock embankments, and making it necessary to take the railroad line close to the water's edge. At two points, in order to avoid sharp curvature, we must enter somewhat upon the river itself: but there will be no difficulty in the structure, as

the current is not rapid, and it will be simply a case of sustaining walls. At the end of this distance it will be necessary to gain ground ahead by a somewhat heavy excavation and embankment. The next five and a half miles takes us across a bend formed by a spur running northwest and southeast. Here we have a choice of routes. We can either lay our course back from the river, or we can pursue the river bank itself. There will be no tunnelling in this distance on either line ; but, looking to the interior line, we cross a spur four miles from the beginning of this section, which will involve a somewhat heavy earth excavation, in order to adjust reasonable grades to the ground. I will refer especially to the map to show the general character of this section. I was pleased, in passing over it, to find it well watered, well grassed, and the great body of it arable. The woods are open and the trees somewhat large. The grade will not exceed thirty feet to the mile. From the best information that I could get of this whole section, I am of opinion that the railroad line should keep on the river bank. For two miles more we continue on the same general plateau, which, at points, somewhat narrows, but never gets an elevation exceeding fifty or sixty feet above the river. Good grass is found along this distance. Looking to my narrative of 1853, it will be found that half a mile before reaching the end of this distance there is a small streamlet, which sinks into the plateau, where I camped, on my return trip of this year, November 15 and 16, and where I camped October 7 and 8, 1853. At this point, looking eastward, the trail leaves the river, and, passing over hills, continues some eight miles before reaching the river again. Here is the point where the railroad line must first cross the river. I had examined, in the most careful and considerate manner, the whole course of the river from the mouth of the St. Regis de Borgia to this point, and we get the best grades, the most reduced excavations and embankments, and in all respects have the best railroad line, by keeping on the eastern or right bank of the Bitter Root river to this point. We must now cross the river, which is here two hundred feet wide, with banks about forty feet high. The ground is remarkably well adapted to a bridge crossing. The timber is of the most superior quality for all purposes of bridge construction. Keeping on the western bank of the river, there are no difficulties whatever in the construction of a railroad; easy grades can be adapted to the ground. In four miles and a half a marsh is met with, but that will require only embankments of twenty feet. At the end of this distance—six miles—the river, if necessary, could be crossed again to its right bank, but, after careful examination of both these shores, I am satisfied that the crossing should be made further on. So, for a mile and a half, we keep our railroad line on the left or western bank of the Bitter Root river, on which distance the first thousand feet will be large and extensive rock excavation; the remaining distance is a plateau, under a side hill. At the end of this distance the railroad line must recross the river. The banks are low, the distance across not exceeding two hundred yards. There will be no difficulty in adjusting curvature to the ground, but on either bank there will be considerable rock excavation, and a still heavier earth excavation and embankment. In seven miles and a half after the crossing the country is such that we have to make a passage from one plateau to another forty feet below it, which will require a heavy embankment and a bridge. In a mile further on we come to, also, a heavy embankment of forty feet; and for three-quarters of a mile we have to maintain this embankment and build two bridges. One of these will be a considerable bridge, perhaps one hundred and fifty yards long. We then pass a plateau, where will be involved one deep cut, with some rock cutting. Thence, to camp, seven miles and a half further on, we pass over a country easily adapted to grades, with very moderate excavations, the grade not exceeding twenty feet to the mile. Along the whole course of the Bitter Root there will be more or less curvature, and in the location there must

be the very best judgment exercised, so as to make the best use of all the circumstances of the ground; but, on the most careful examination of all the localities, I am satisfied that the grades will be moderate, the excavations and embankments will be small, the bridge crossings will be light structures, and that a most feasible railroad line can be taken down the Bitter Root to the mouth of the St. Regis de Borgia.

Saturday, July 7.—Before we left camp this morning the special agent of the Flatheads, Mr. Adams, joined us, looking in fine health and spirits, showing the good effects of a long sojourn in the wilderness to develop the physical strength of the species. He informed me very thoroughly about all the arrangements he had made for the council with the Flathead nation. We then moved camp, and in three miles met the chiefs and braves of the Koutenay, Pend d'Oreille, and Flathead tribes, who received us in the most cordial manner, and with salutes of musketry accompanied us to their own camp on a little tributary of the Bitter Root, where, after having stayed some hours and made a careful examination of their condition, meeting all our old friends, and establishing the most cordial *entente* between them and our people, we made our own camp on the Bitter Root, some seven miles from our camp of last night. I will defer to a subsequent occasion any remarks about a continuation of the railroad line.

This is not the place to go into the details of the Flathead treaty, although my duties as an observer of the country were strictly incidental to those as commissioner of the government in making treaties with the Indian tribes. To this latter duty my attention was devotedly given for the eleven following days, though I did not neglect every possible test which my opportunities enabled me to apply to the physical geography and the development of our knowledge of the country. Thus I had all our barometers brought down from Fort Owen. I had daily observations made of the barometer and thermometer, with a view of ascertaining the altitude of our camp above the waters of the ocean, and of making such comparisons between our various instruments that I could rely upon our field observations hereafter. I had lost all the observations of 1853. They had been confided to the charge of Lieutenant Donelson, who, making the best disposition that he could to insure their safely getting on to New York, lost them on the Isthmus. This tended to throw doubt upon my whole work as regarded the altitude of the country, and I desired to vindicate my work of 1853 by my observations in 1855. I trust the time will come when my treaty operations of 1855—the most extensive operations ever undertaken and carried out in these latter days of our history—I repeat, I trust the time will come when I shall be able to vindicate them, and show that they were wise and proper, and that they accomplished a great end. They have been very much criticised and very much abused; but I have always felt that history will do those operations justice. I have not been impatient as to time, but have been willing that my vindication should come at the end of a term of years. Let short-minded men denounce and criticise ignorantly and injuriously, and let time show that the government made no mistake in the man whom it placed in the great field of duty as its commissioner to make treaties with the Indian tribes. So, leaving all these things to the proper occasion, and turning our minds simply to the physical geography of this country, we will now part with our Flathead friends, with whom we had made a treaty of peace and cession—every man pleased and every man satisfied; and this satisfaction has continued until this present hour. We left them on Wednesday, July 18, to move forward to Fort Benton.

CHAPTER XII.

BITTER ROOT VALLEY TO FORT BENTON, AND RETURN TO OLYMPIA.

Hell-Gate Valley.—Mr. Pearson's achievements as messenger.—Hell-Gate Canon.—Our Pend d'Oreille Guide's success in hunting.—Upper Blackfoot Valley.—The Prairie of the Knobs.—Salmon Trout Creek.—Belly Prairie.—Lander's Fork.—Routes for a Railroad.—Lewis and Clark's Pass.—Dearborn Valley.—Heart mountain.—Debouche of Dearborn River.—Grizzly Bear Lake.—Mauvaises Terres.—Fine Springs.—Teton Valley.—Elder Box Creek.—Interesting incident with Indians at Fort Benton.—Mr. Doty's search for stolen horses.—Crosses Milk River.—Lake Pah-ka-kee.—Belly River.—Bow River.—Returns to Fort Benton.—The Nez Percés and Flathead Camps.—Mr. Landsdale's examination of the Bitter Root Valley and Flathead River.—The Council at the mouth of the Judith.—Character of the surrounding country.—Citadel Rock.—Mr. Pearson's return from Olympia.—His journey.—The Missouri towards mouth of Marias.—Success of Blackfoot Treaty.—Return trip to Fort Benton and the Pacific.—Intelligence arrives of the Indian war in Oregon and Washington Territories.—Train halted.—Gov. Stevens proceeds to Bitter Root Valley.—Mr. Doty returns to Fort Benton for supplies.—Fort Owen.—Hell-Gate.—Alarming reports.—Mr. Doty's arrival.—Crossing of Bitter Root Mountains.—Mr Doty's examination of approaches to Stevens' Pass.—Meeting of Indians near Cœur d'Alêne Mission.—Cordial reception.--Wolf's Lodge.—Stormy councils on the Spokane with Indians.—Final success.—Hostile intrigues of Looking-Glass, a Nez Percés chief.—Arrival at Walla-Walla.

FLATHEAD COUNCIL GROUND TO THE APPROACHES TO LEWIS AND CLARK'S PASS—BIG BLACK FOOT RIVER.

Moving from our camp of July 6, we this day (July 18) continued over the Hell-Gate Ronde, and encamped a little above the junction of the Big Blackfoot and the Hell-Gate rivers, on the right bank of the former stream. The details of this day's journey, from our camp on the Bitter Root, where we held our treaty with the Flatheads, are as follows: We moved across the Hell-Gate Ronde for six miles, and came to a small stream lined with service bushes; at this point is the ford of the Hell-Gate that takes you to Fort Owen. We then proceeded up the valley of the Hell-Gate two miles, in a valley from one to two miles wide, with good grass, and in four miles we made our camp. The railroad line throughout this distance may be laid very nearly in a straight line to the Hell-Gate Ronde, the grades easily adapted to the ground. The highest rise of the river, either the Bitter Root or the Hell-Gate, is only about five feet above the present level, and the present height is less than one foot above the lowest water. I organized an express service on these treaty operations, which it may be well for me to refer to. At Fort Walla-Walla, on concluding the treaty with the Nez Percés, the Yakimas, the Cayuses, and the Walla-Wallas, I despatched Pearson to Olympia with reports to the Indian commissioner, and with official letters to the officers of the Indian department in the Territory. Pearson, on his return, reached the Bitter Root valley in season to take back, on the morning of July 18, full reports of the Flathead council to the Indian commissioner and the officers under my direction. I suppose there has scarcely ever been a man in the service of the government who exceeded Pearson as an express man. Hardy, intelligent, bold, and resolute, having a great diversity of experience, which had made him acquainted with all the relations between Indians and white men from the borders of Texas to the 49th parallel, and which enabled him to know best how to move, whether under the southern tropics or in the winter snows of the north; this year he did for the service under my supervision a labor which requires from me at the present time the most ample acknowledgment.

Thursday, July 19.—I desire not to go too much into detail in regard to a route which I have already reported upon, for I am now upon the trail which I followed in 1853; but leaving our camp of this morning our route was through what is known as the Hell-Gate or Blackfoot cañon, which continues for some 18 miles. This is not a cañon, properly speaking; there are no perpendicular bluffs; there are no serious difficulties in the way of a wagon road or a railroad, but the course of the river is sinuous; points project down to the river from either side, and the very careful examination which I made of the course of the river to-day developed this feature in the character of the route; wherever a point came down on one side of the stream, there was to be found a prairie on the other. So, by several crossings of the river, or from time to time cutting into points of rocks, there will be no trouble in laying a railroad line without the use of a single enrockment or sustaining wall. I regretted that, after passing up from our camp six miles, I was not able to cross the river and examine carefully and personally a route on its southern bank leading through the Kamas prairie of the Flatheads. This route was pursued by my secretary, Mr. Doty, in 1854, and at the end of this day's journey he assured me that it was a much more favorable route than the one I pursued to-day, and which I pursued in 1853, whether as regards the construction of a wagon road or a railroad. In my narratives of 1853 and 1854 I have quoted sufficient from the remarks of Mr. Doty and Lieutenant Saxton to show the general character of this Kamas prairie field of the Flatheads. Therefore, in any future examination of location the two sides of the river will have to be very carefully examined; and I refer to it on this occasion simply with a view of calling attention to the fact that there are probably practicable lines both north and south of the Blackfoot. Looking to my notes of this day's journey I find that they are in exceeding detail, but I do not deem it necessary to go into any further elaboration of the character of this route. Occasionally the trail led us back from the river, and we found abundant streams of water and large forest trees, but the woods were of an open character, with good grass and arable land; and, finally, on emerging from the cañon we came to a most delightful camp in the valley of the Blackfoot. Here we put to work our Pend d'Oreille guide and hunter, who had been placed at our diposal by Alexander, head chief of the Pend d'Oreilles, and who in less than an hour had for our supper the finest string of trout I ever saw in the mountains. Not content with which, however, he started out again; we soon heard the report of his gun, and half an hour afterwards he brought into camp an elk weighing at least seven hundred pounds. This elk he killed in a somewhat narrow fringe of forest trees, interspersed between the Kamas prairie of the Flatheads and the waters of the Blackfoot.

Friday, July 20.—We made an early start this morning and continued up the valley of the Blackfoot. This valley for the most part is wide and open. The spurs separating it from the Hell-Gate valley on the south, and which separate on the north the various tributaries flowing into the Blackfoot, are all of them somewhat low and gentle in their character. Indeed, when we come carefully to examine the fringe of cotton-wood on the banks of the Big Blackfoot itself, and to look beyond those trees to the neighboring spurs and slopes, we found that we were in the midst, generally speaking, of a prairie country. Most of the slopes between the Blackfoot and the Hell-Gate, and between the several tributaries of the Blackfoot itself, were grassy slopes of a gently rolling character; and large portions of the soil arable. As I moved up the valley I began to realize the fidelity of the description of Lewis and Clark, who speak of this whole prairie of the Blackfoot, over which our day's journey led to-day, as the Prairie of the Knobs. On a map of the usual scale, these knobs or little ridges were too small to be represented, the slightest mark on the map would exaggerate them. In short, I will speak of

our journey to-day, (some 32 miles,) as being through one of the most delightful well watered, and well grassed countries I have ever seen; and here must be a fine place for settlements. We camped this evening near the mouth of the Salmon Creek river, on the banks of the Big Blackfoot; and our guide again to-night regaled us with the beautiful mountain trout of this country. Looking to our day's journey of yesterday and to-day, I began to see how much this country was a prairie country; how open the forest land was; how generally arable it was; and I was able to realize the truth of the description of the Jesuit missionaries who had preceded us.

The following itinerary of this day's journey is worthy of mention. The first seven miles is through a prairie valley, generally from three to four miles wide, at the end of which distance we come to the trail already referred to, leading to the Kamas prairie on the left bank of the Big Blackfoot. Here is a low spur, closing the view from the river and running in a northeast and southwest direction. The next mile and a quarter is over a low ridge and through open wood, which may be considered a portion of the Blackfoot valley. In a mile and a half we came to a stream of running water, the country very well grassed on each bank, and in three-quarters of a mile further to a fork of the Blackfoot, with a wide open prairie re-entering running well to the north. Here is the point where Mr. Tinkham left the Big Blackfoot valley, in September, 1853, to make the cut-off to the Jocko. In two miles and a half further on we strike the Big Blackfoot. This particular valley narrows to a quarter of a mile, but the general valley of the river is wide and open. The immediate valley of the Blackfoot is generally about six to ten feet above the water level. Going on two miles and a quarter we cross a considerable stream coming in from the left, and in two miles strike the Blackfoot again. Here, also, the Blackfoot winds through an open, low-banked valley, the width of the undulating or knob prairie of this general valley being at this point from eight to ten miles. For the next six miles the route passes through the knobby prairie already described. Throughout the valley of the Big Blackfoot, in this portion of its course, no sharp curve or abrupt descent will be required, and the immediate valley is quite wide and uniform. Three hundred yards above our camp of this evening is the mouth of the Salmon Trout creek, which flows into the Big Blakfoot from the north, and passes between rocky bluffs just above its mouth. These bluffs furnish very good building material, and thus will be useful to a wagon road or railroad construction.

Saturday, July 21.—Commencing our journey a little after 7 o'clock in the morning, we crossed in two miles and a quarter the Salmon Trout creek. The valley of the Blackfoot is now some seventeen miles wide, well watered and well grassed throughout. The larger streams, however, come from the north. After making nine miles from our morning's camp, we reached my camp of September 25 and 26, 1853, and Lieutenant Donelson's camp of September 24 to 26, 1853, on the main Big Blackfoot, south of which point the valley makes a large re-entering to the south, with banks above the water level some sixty feet, although at Lieutenant Donelson's camp the width of the banks above the water is but twenty feet; at this point the Blackfoot flows nearly southward some five or six miles, at which point it receives a tributary running nearly from the east. Here there is a very extensive prairie valley bordered by a rolling prairie country. Although we did not have a good view of the upper portions of this tributary, yet, from information collected from our guides, we learned that there were considerable prairies and good land nearly all the distance up to the divide of the Rocky mountains, from whence it had its source, and that, also, in this direction there is a trail leading to the waters of the Missouri. Starting, however, from our camp of 1853, and keeping on the north bank of the Blackfoot, passing over a low bluff coming well down to the banks of the river, in a quarter of a mile we came to the entrance of the cañon, so called, not because its sides are perpendicular bluffs, but

because the wide and open valley through which we pass now narrows somewhat, being at times only about one-quarter to one-third of a mile wide. As we entered this cañon we found the Blackfoot to flow sluggishly through it, with low banks five feet above the water level. The river is somewhat winding, yet requiring the trail to pass over only very low spurs. This cañon is generally wooded, and there is some fallen timber on the trail, but nothing in the way of serious obstruction to animals, and plats of grass were found from point to point sufficient for very good camping grounds. As we entered the cañon, it may be remarked, we passed over the bluff already referred to, making at one point a height of 120 feet above the river, which gave us a very excellent view of the country to the south, and the southeastern tributary already referred to. The width of the open valley here is some fifteen miles. The divide separating these two branches of the Blackfoot, both having their sources in the Rocky mountains, was wooded, and from 400 to 500 feet high. To the north, a hill immediately overlooking the cañon was about the same height. I will observe that the prairie valley of the Blackfoot, for the last twenty-two miles before entering the cañon, has an average width of ten miles, with three large creeks coming from the north and one from the south. This does not include the prairie spurs and divide between the Blackfoot valley and the Hell-Gate, nor does it include the prairies to be found on these various tributaries, some of them very extensive.

But to continue on in the cañon. The first eight miles have been sufficiently described. Barometrical observations were taken at necessary points, and the streams were found to be sluggish all the way. Three miles and a half further brought us out of the cañon into a fine opening of the prairie known as the Belly. The general width of the cañon was two-thirds of a mile. Towards its upper portion, that is for the last three miles and a half, there were no falls in the river, but the current was rapid. Some crossings of the stream will be required either in the construction of a railroad or a wagon road; the timber growth on the side hills becoming smaller. The next seven miles and a half takes us through the beautiful Belly prairie of the upper Blackfoot, beautifully wooded on the adjacent spurs, and with cotton-wood in the immediate valley of the stream; well watered, and grass luxuriant. In the first mile and a half of this distance we cross two streams coming in from the left. After crossing the second of these streams we continue along its banks for some three miles. This portion of the valley averages in width some four miles, and near the middle portion of it about six miles wide. Here, again the Blackfoot flows with a rapid current, but few falls; the banks are low. The greater portion of the Belly prairie is intervale land. After travelling half a mile further we left our trail and went south to the Blackfoot, a distance of three-quarters of a mile, where we encamped. I have thus been particular in describing the Belly prairie of the Blackfoot river, because, being so near the divide of the Rocky mountains, as will appear by the account of to-morrow's journey, I desired to present the character of this country as shown in one of its mountain valleys.

LEWIS AND CLARK'S PASS AND APPROACHES—BIG BLACKFOOT TO SUN RIVER.

Sunday, July 22.—Leaving camp early this morning, and starting from the point where we left the trail yesterday to camp on the Blackfoot, in two miles and a half we reached a large tributary coming in from the north, which was named by Mr. Doty, in his trip in 1854, as Lander's Fork. This name I have thought it best to retain. At this point I despatched a train, in charge of Mr. Higgins, up Lander's Fork, along the usual travelled trail, to Lewis and Clark's Pass, and continued up the Big Blackfoot myself, with my secretary, Mr. Doty, and my from interpreter, Mr. Sohon, in order to make the connection of the railroad line from

Lewis and Clark's Pass to the Blackfoot, which had not been established by Mr. Lander in 1853. I proposed to go up the stream flowing from Lewis and Clark's Pass to the point where this examination was abandoned, as stated in the report of Mr. Lander. So continuing up the Blackfoot valley for four miles and a half, I came to the creek which I supposed to be the one flowing from Lewis and Clark's Pass. I found that up this portion of the valley there would be no difficulty in arranging grades to the ground without heavy excavation and embankment, and entering a low (comparatively speaking) cañon, from which the stream flowed into the Blackfoot valley, I found there would be no difficulty in keeping on side hills, making some sharp curvatures, and entering the valley at a sufficient height to obviate all difficulties ahead. We went up the stream and soon came into a large very gently rolling prairie of several thousand acres in extent, beautifully grassed, with cottonwood on the streams, pine on the upper portion of the streams, and the country generally arable. As we passed up this prairie, looking eastward we saw the divide of the Rocky mountains, and we could perceive no special traces of the tributary between us and the divide. But the stream gradually gave out; and continuing almost northward, we fell into the trail passing from Lander's Fork to the stream flowing from Lewis and Clark's Pass, for which we had been searching, and over which trail the hoofs of our animals had passed that morning. Continuing on the trail, we reached the stream with the satisfaction of knowing that, though we had learned some features of the country, we had yet pretty much all our work to do over again. After taking the necessary barometrical observations, I went down the stream for some two miles, one mile and a half of this distance lying over a remarkably uniformly descending river bottom; then the stream turned immediately to the south and passed through an impracticable canon. In order to get a view of the country we immediately ascended some very steep bluffs to the eastward, towards the divide of the mountains, and finally reached a point where the whole country lay before us. Here we saw the rolling prairie over which we had passed this morning, the stream from Lewis and Clark's Pass winding on its left through the rocky cañon, and at our feet a very low divide, which made it almost a matter of demonstration to us that we could pass from the valley stream by a low cut to the open prairie, and gain the Big Blackfoot by the stream up which we had come. Immediately pushing down to the low divide referred to, I caused a sketch of the country to be made, had the necessary barometrical observations taken, and found not the slightest difficulty, by a cut of a few hundred feet, in carrying a railroad line down on grades not exceeding from sixty to sixty-five feet to its connection with the Big Blackfoot; and thus, partly by accident and partly by indefatigable exertions and good judgment, we were able to accomplish the connection of the line of the Big Blackfoot with the line from Lewis and Clark's Pass.

Starting now from the point where the trail from Lander's Fork strikes the stream flowing from Lewis and Clark's Pass, we continued up the latter stream for five miles, passing over the most remarkable valley that I have ever seen in the immediate region of a mountain divide. (See sketch.) Its width and the declivities of the ground were remarkably uniform; the valley not less than half a mile wide; the bottom—excepting a small portion of the lower part, where were beaver dams—always above the freshets, until we came to a point where I halted for a few moments in order to observe with the barometer. Here there was a fork in the stream, the left hand branch coming immediately from Lewis and Clark's Pass, and the larger and right hand fork coming from the north some little distance, judging from the quantity of water in the stream. We now kept up the left hand fork and passed over Lewis and Clark's Pass, where many observations were taken, both of the immediate basis of the divide on either slope and at

Sohon, Del.

BIG BLACKFOOT VALLEY

the summit. This divide can be arranged for wagon roads with gentle declivities on either side. Little or no timber would have to be cut away. We found grass on both sides of the mountain, as well as near its summit. Going down the eastern base on our right, and some little distance below the trail, was a fine stream of water, a tributary of the Dearborn, and about a mile and a quarter from the summit we came to another tributary connecting with this coming from the north. It is on this tributary that a railroad line must be laid in order to tunnel the mountain in the shortest and most practible line. From the top of the mountain, it may be remarked, we had a delightful view of the country before us about an hour before sundown. The air was perfectly transparent, and we could see, running nearly to the north, the mountain spurs of the main chain of the Rocky mountains, with many tributary valleys and streams connecting with the Beaver creek and the Dearborn, whilst the country between us and the Dearborn, and beyond it as far as the eye could reach, was somewhat broken, yet it was uniformly well grassed; and, as we travelled over the route to the night's camp, we found large portions of the country arable, although it would be impossible to predict to what extent farming would be restricted by the early and late frosts. I found that to lay a railroad line along the spurs of the approach to Lewis and Clark's Pass it would be necessary to curve in and out, in order to cross the various mountain valleys with embankments not excessive, and that even then it would be essential to deal boldly with the projecting spurs; but the most serious difficulties in this way would occur the first two miles from the entrance of the tunnel, and all the embankment involved in establishing the road would be furnished from the excavation of the tunnel, and therefore ceased to be an item of expense or even of difficulty. After crossing several low divides and intermediate streams and valleys, I reached camp, greatly exhausted by the night's work, an hour and a half after sundown, where I had been preceded by my train some four hours, and where everything abounded that was required to furnish the conditions of a good camp.

Monday, July 23.—Leaving our morning's camp, in three-quarters of a mile we ascended the valley to a ridge some seventy feet above it, and in three-quarters of a mile more came to a ravine ninety feet below the route on either side. Here there is no difficulty in laying either a wagon road or a railroad so as to essentially avoid this ravine. In one mile and a quarter we came to a ridge whence the ground descends to Dearborn river. Thus far on our morning's journey the ground has gently undulated. The second ridge referred to is slightly higher than the first; and two successive ridges occur, rising perhaps twice as much as these particularly described. To the left of us the ground in about six hundred feet rises about one hundred feet—that is, on a grade of from one to six; and on the right it falls about the same distance in some eight hundred feet. These particularities of the ground are given to show the little difficulty there will be in laying the grade along this portion of the route without very heavy excavations and embankments, but in the railroad report the matter will be gone into in great detail. The next one mile and seven-eights the ground is also gently undulating; there are no special features that require mention except that at the end of a mile and a half there was a ravine some forty feet deep, which in three-eights of a mile gave out and was replaced by a low ridge. On the left the ground still gently undulated; and to avoid the little peculiarities of the ground, and the ravines and ridges which have been mentioned, the road will be laid about one-third of a mile to our left. In half a mile further the trail passes down a ravine and up a rise, when we have a view of the valley of the Dearborn river, and in a quarter of a mile it descends into the valley of the Dearborn, which, although somewhat narrow, has fine grass and excellent soil. Here the valley of the Dearborn opens into a beautiful ronde, affording a most delightful

spot for a camp. This is an old Indian camping ground. The ronde extends about three miles along the river, and it is about one-third of a mile across. One mile up the valley of the Dearborn its banks come together, affording all the facilities for bridging. The valley itself is some three to six feet above the water level, and is never overflowed. The trail crosses the ronde diagonally for about a half a mile, and in one-eight of a mile we reach the immediate crown of the height bordering the valley, and in five-eights of a mile further reach a divide, presenting to our view a generally level but somewhat undulating country. Here we have a view of the Heart mountain, of the debouche of the Dearborn river from the mountains, and of the general character of the country. Going northward half a mile to a point giving a very good view, I could see how, by leaving our trail some miles on the other side of the Dearborn and keeping well along the side hills, I could cross the Dearborn from one and a half to two miles above where it was crossed by the trail, and lay the line somewhat along its valley, and on an extension about midway between our trail and the Heart mountain, so as to give good grades without heavy excavation or embankment, but with some rock cutting. It may not be necessary to give the minute details of the remainder of our day's journey, except to say that the country consists of a series of low divides and intermediate depressions until we come within some eight miles of the forks of Sun river. We took a considerable number of observations, in order to have all the means of making a profile. We had a clear and distinct view of the Elk or southern fork of Sun river, which furnishes a most excellent railroad line; and crossing to it from the line already referred to as the proper line of direction in the vicinity of the Dearborn, will enable the road to descend into the valley of Sun river with very light excavation and embankment, and with no difficulty of a serious character at all, save from a point some six miles above the forks. The plateau or prairie country immediately bordering Sun river was replaced, at one and a quarter mile from the forks, by a low slope connecting this plateau with the immediate valley of the stream. The distance travelled to-day was 22⅞ miles. I will observe in regard to Dearborn river, that about a mile and a half above our crossing it has a direction nearly parallel with its course below the crossing; that then it turns for three miles well to the north and east, and with another turn more to the west is seen to issue from the mountains two miles and a half beyond.

SUN RIVER TO FORT BENTON.

A very good description of Sun river will be found in a previous portion of the volume. I found Mr. Doty's description to be very correct. I am satisfied, from the appearance of the forks and the adjacent country, and from a large depression south of our trail, which I took to be Grizzly Bear lake, that Mr. Doty is correct in his judgment that Mr. Lander, in 1853, crossed Sun river, not at the forks, but at the island some six miles below. Looking back to the previous route in 1853, I found the country within six miles of the forks to present more difficulties in the way of a railroad than I had expected; and it would not be practicable to adopt grades to the ground of less than sixty feet, without exceedingly heavy excavations and embankments, and very sharp curvatures. On the line laid down by Mr. Lander, the excavations and embankments as far as Sun river would be very excessive; and southward to Cadotte's Pass it would be a difficult matter to adjust a railroad line from the forks of Sun river without, also, heavy embankments. It is indispensable for either pass, if the forks of Sun river are made, to keep up the south fork somewhere about ten miles, and to pass somewhat nearer to Heart mountain than on the line reported by Mr. Lander. Sun river, from the generally wide, open, and direct character of its valley and the facility with which its lower portion may

be turned to approach Fort Benton, on the general line of the Missouri from Sun river to Fort Benton, is a feature in the railroad practicability of this portion of the country. I would not, therefore, think it expedient, Sun river being once made, to continue over the upper portion of the plateau from the Sun to the Teton, thence to the Marias, and thence to the Milk river, but to take a line which will bring us to the waters of the Missouri at Fort Benton, and thence to Milk river. But to resume our narrative:

Tuesday, July 24.—The width of the river at our morning's camp is some sixty yards; the highest water above the present water level, sixty feet; the length of a bridge required to cross, 200 feet; and its height above the water level, ten feet. The banks consist of sandstone, clay, and gravel. At this point the forks of the river have a very gradual ascent and descent, presenting no difficulty in the way of construction. The general character of the country on to-day's journey is very much the same as on the route of yesterday, from the Dearborn to the Sun river. The country is rolling and undulating, and by reference to the profile the best idea will be obtained of the relation of the several divides, of the rolling prairie, and of the corresponding valley depressions. The first 2⅜ miles from the river brings us to the top of the first plateau, and 2⅝ miles further we reach the crest of the second divide. In 3¼ miles we reach a third divide, and in 1⅝ miles a fourth. These ridges run nearly east and west, and have to be crossed almost directly in laying a railroad line over this upper plateau. The fifth divide, three miles further on, which is lower than the previous ones, brings us in view of the valley of the Teton. In two miles further on, and about a mile and a half to the right of our trail, we observed a small lake, having little or no water in it at the present time, but evidently, from the appearance of the green rushes, a considerable lake in the spring, and probably in the early summer. This we took to be Mr. Lander's Grizzly Bear lake. Going on three-eighths of a mile further, there was a small formation of mauvaises terres, at the end of which was a small descent of the country, where immediately on the left of the trail we observed three beautiful springs of cold water, discharging about a gallon and a half per minute. This water wells out of the clefts of the rock, is very pure and cold, and feeds a stream which flows about one hundred feet before the water is absorbed into the ground. Our distance now for five miles, to the edge of the plateau bordering on the Teton, is a level prairie, similar to the country about the forks of Sun river; when, moving down the river a quarter of a mile, we camped on its banks in a beautiful piece of intervale, some four feet above the water level, where the river branches out somewhat into sloughs, which are obstructed by beaver dams. The Teton valley has been described previously, and therefore it will be sufficient for me to say that we continued down the Teton, having, on July 25, a good view of the Woman's Breast, (whence the Teton derives its name,) of its upper tributaries, and of its bottom and miry creeks. Made twenty-six miles this day, and on Thursday I pushed on to Fort Benton, my train coming in the next day. Here I was much pleased to meet my old acquaintances, but learned nothing of the whereabouts of Colonel Cumming, my associate commissioner. This, I expected, would give me time to make some other examinations of the country. I very much regretted to find that the arrangements made by Mr. Doty for barometrical observations, during the past winter and the present year, had been ineffectual, in consequence of Mr. Tevis, the gentleman who undertook to take them, having returned to St. Louis early in the winter.

EXPLORATIONS AND INCIDENTS IN CONNEXION WITH THE BLACKFOOT COUNCIL.

My party were camped on the Teton, where Mr. Sohon was busily occupied in working at the sketches of the route, and where he took regular barometrical observations through the day; and on the 11th of August, having received three days previously a letter from Colonel Cumming, who was at the Porcupine river, informing me that he should move along as rapidly as possible, I concluded to go on to Milk river to meet him, more especially as I was anxious to avail myself of the opportunity of reviewing this portion of my route again. So, accompanied by Mr. Doty, Mr. Sohon, and a small party, we reached Milk river on the 13th of August, camped the first night at the springs, and the second night at the Box Elder creek, eighteen miles from Hammell's Houses on Milk river. It is probable that this portion of the country has been sufficiently described, and the results of this little trip will appear simply in the details which I shall furnish of the railroad line along this portion of the route. It would encumber this narrative to go outside of the subject which I propose to present, but I will observe that the use of our numerous expresses, indispensable to keeping in hand and bringing together the Indians, enabled us considerably to extend our knowledge of the country. Without referring particularly to dates, we obtained valuable information from Mr. Doty, from Sub-Agent Tappan, Special Agent Adams, Mr. Burr, and especially Dr. R. H. Lansdale, Indian agent, as well as from A. H. Robie, who had charge of our hunting parties, making at one time a trip to the Judith for buffalo meat, at another time nearly to the Three Buttes, and making several trips down the Missouri either to the boats to get provisions at the mouth of the Muscle Shell, or to the Citadel rock to kill bighorn.

MR. DOTY'S TRIP TO THE SASKATCHAWAN, AND RECOVERY OF THE FOUR FLATHEAD HORSES.

A most remarkable incident occurred at Fort Benton, which I will give, because it illustrates somewhat how voyaging may be done in this country. In the arrangements which I made in the Bitter Root valley with the Indians to attend the contemplated council on the Missouri, I was met by the objection that there being no escort to protect them, their old enemies, the Blackfeet, would steal all their horses. I reminded them of the message which I had brought them from the Blackfeet in 1853, and assured them of my belief that they would be received in good faith, and treated with kindness and hospitality by the Blackfeet, using this expression, "I will guarantee that when you pull in your lariat in the morning you will find a horse at the end of it." On the 29th of August, about sundown, four Pend d'Oreille boys came to my camp, which a few days before had been removed from the Teton to the Missouri, a quarter of a mile above Fort Benton, with a message from their chief, Alexander. Very much against their own judgment they placed their horses, by my direction, with those of my own band; but before midnight two Blackfeet boys, of the northern tribe, picked them out from a hundred horses and ran off with them, we could not discover where; for although I put the Little Dog to search for their trail, thirty hours' work and a hundred and odd miles hard riding did not enable him to find a single foot mark of the missing animals. To get these animals back, therefore, was necessary to inspire our western Indians with confidence, and was, indeed, indispensable to making the treaty. Accordingly, without waiting the return of the Little Dog, we sent Mr. Doty, with a single white man, north to the camp of the Blackfeet, on the Saskatchawan, to recover these animals. We thought the Blackfeet would expect us to search for them among their bands down and south of the Missouri, and that they felt perfectly secure from being followed up so far north. Mr. Doty

continued on the trail, making fifty miles a day, sleeping several times on the prairie, until he struck the Bow tributary of the Saskatchawan, two hundred and thirty odd miles from Fort Benton, entering the large Blackfeet camp two hours only after the four stolen horses. He immediately called the chiefs, demanded the horses, received three of them, and placed them in the hands of the Little Dog, who, after returning from his fruitless search for the trail, had started off, without resting, to join his old friend Doty. One of the scamps, however, got off with the fourth horse, and Mr. Doty started off immediately in pursuit, moved over seventy miles in a day to the Elk tributary of the Saskatchawan, and there received from the chiefs the fourth horse; and on the sixteenth day after these horses were stolen from my camp they were returned to the four Pend d'Oreille boys at Fort Benton. This was the last, as it was the first, stealing of horses by the Indians. A full account of this trip of Mr. Doty is given in the proceedings of the Blackfoot council, of which the following summary is given:

Starting from Fort Benton on the evening of August 30, he crossed the Marias river on September 1, about thirty miles from its mouth. The river was seventy yards wide, and two and a half feet deep at the ford, with a three mile current. The valley was from one-half a mile to two miles wide, well timbered with cottonwood, and having a soil of reddish or ash colored loam, which in many places appeared well adapted for agricultural purposes.

He then crossed the plain northwestwardly to the base of the most westerly of the Three Buttes, where there was a fine grove and several springs of excellent water. Thence, continuing northwardly, he reached a coulée tributary to Milk River valley, which had perpendicular walls of red sandstone a hundred and fifty feet high, wooded along the stream with the narrow leaved cottonwood, a tree common from the eastern base of the mountains to the Pacific coast.

Crossing Milk river, he passed to a high, level plain, of different character from that on the south side. The soil is a sandy loam; the grass, though short, forms a heavy turf, and the prickly pear had disappeared. Twenty miles due north he reached Lake Pah-ka-kee, or Unlucky Water, which has a strong odor of sulphuretted hydrogen, perceptible at a distance of a mile. The Indians and horses drank of it without any bad effects, although it had been supposed to be the cause of death to a number of horses lost here by the Indians some years before. The report of its being salt, before generally credited, was thus disproved. Its shores are gravelly, and its water clear. It lies at some distance north of latitude 49°. Forty-seven miles further north he struck the Mo-ka-un, or Belly river, fifteen miles above its junction with Bow river. The stream is here 150 yards wide, and is deep, with a current of four miles per hour; the water clear and cold, and the shores gravelly and sloping. It is subject to a freshet of forty feet, as shown by the pine driftwood scattered in its valley. No timber grows on its banks near the point then reached. Going up this river about twenty miles, he left it and followed a branch destitute of wood towards the northwest, and proceeded across the plain beyond for thirty miles, to a marshy lake, and twenty miles further reached Bow river. He then followed this up for thirty miles, and crossed it at a ford 300 yards wide and so deep as to run over his saddle. This being the last encampment of the Indians who hunt and trade on American soil, he started on his return September 8. There was a heavy storm of rain and hail that night and the next two days. He arrived at Fort Benton on the 15th, having travelled 583 miles, and connected the reconnoissance of Mr. Stanley and Mr. Tinkham with his own exploration along the eastern base of the mountains, and examined the country far northward of the boundary line.

Northward both wood and water became more scarce, for although the rivers are large and deep they have fewer and more distant branches, and are usually destitute of timber.

Mr. Adams and Mr. Tappan remained with the Indians nearly all the time until the council was assembled in October, the former with the Flatheads, and the latter with the Nez Percés, in the country between the Missouri and the Yellowstone. Proceeding down the Judith river to its mouth, following out a considerable portion of the Muscle Shell, and over a hundred miles of the Yellowstone, Mr. Tappan went south of the Yellowstone, some distance up the upper tributaries. The country south and east of the Judith, in the direction of the Yellowstone, they found somewhat deficient in grass and water. In September Dr. Lansdale, the Indian agent, made a careful examination of the Bitter Root valley and of the country on the Flathead river, from the Coriacan defile northward and eastward, through a country watered by the Jocko river, Prune creek, and other streams; and he describes that whole country of which you have a view, passing from the valley of the Hell-Gate to that of the Jocko river, as one of the most rich and inviting countries he ever saw; the view most extensive, the country arable, the streams well timbered, and good facilities for establishing mills and supplying them with timber.

CHANGE OF COUNCIL GROUND—EXPRESS TRIPS OF PEARSON AND HAZARD STEVENS—MOUNTAIN MEN.

The council was not, however, held at Fort Benton, but at the mouth of the Judith, which enabled us to extend our barometrical observations down the river and to examine something of the adjacent country. The country in the neighborhood of the mouth of the Judith, and the greater portion of it between that point and Fort Benton, presents good inducements to the settler. Formations, however, of the mauvaises terres occur at some points, and twenty miles below Fort Benton is the famed Citadel rock, an extraordinary resort for bighorn and smaller game. I will here remark that we had in our employ an Indian hunter, Metsik, who never failed, starting out early in the morning, to get back by night, always heavily laden with the meat of the antelope and the deer. As we had very little bread, sugar, and coffee, for a change of fare the bighorn of Citadel rock was exceedingly delightful as an article of food, and is generally preferred by the mountain men to any other game of the country except buffalo; so between buffalo, bighorn, and the smaller game, we fared very well. The parties who extended our information of the country in conveying messages to the Indians, &c., invariably lived either on the dried meat which they took with them or on the game which they killed from day to day; they had no flour, no sugar, no coffee, and yet there was not a word of complaint from one of them; but we made it the subject of a good deal of merriment when we were able to reach the boats and have a sufficiency of those articles which in civilized life are deemed indispensable to comfort. As the moving of expressmen, also, will give some idea of the practicability of a country, I will remark that on the 27th of August my expressman, Pearson, reached camp from Olympia, having made the distance from the Bitter Root valley to Olympia and back to Fort Benton, some 1,750 miles by the road he travelled, in twenty-eight days, during some of which he did not travel. He was less than three days going from Fort Owen to Fort Benton, a distance by the route he pursued of some 260 miles, which he travelled without a change of animals, having no food but the berries of the country, except a little fish which he killed on Travellers' Rest creek of Lewis and Clark, on the morning of starting from Fort Owen, which served him for a single meal. I might refer to other incidents which occurred at this council, showing how easy it is to travel in this country, but one more will probably suffice. My son, Hazard, thirteen years of age, had accompanied me from

Olympia to the waters of the Missouri. Like all youths of that age, he was always ready for the saddle and delighted in the hunt, and had spent some days with one of my hunting parties on the Judith, where he had become well acquainted with the Gros Ventres. When we determined to change the council from Fort Benton to the mouth of the Judith, I undertook, in the name of the commission, the duty of seeing the necessary messages sent to the various bands and tribes, and to bring them all to the mouth of the Judith at the proper moment. These Indians were scattered from Milk river, near Hammell's Houses, along the Marias, along the Teton, to a considerable distance south of the Missouri, the Flatheads being on the Judith, and the Upper Pend d'Oreilles on Smith's Fork of the Missouri, with two bands of the Blackfeet lying somewhat intermediate, but in the vicinity of the Girdle mountains. I succeeded in securing the services of a fit and reliable man for each one of these bands and tribes, except the Gros Ventres, camped on Milk river. There were several men who had considerable experience among Indians and in voyaging who desired to go, but I had not confidence in them, and accordingly, at 10 o'clock on Sunday morning, I started my little son as a messenger to the Gros Ventres. Accompanied by the interpreter, Legare, he made that Gros Ventres camp before dark, a distance of 75 miles, and gave his message the same evening to the chiefs, and without changing horses they were in the saddle early in the morning and reached my camp at half-past three o'clock.

Thus a youth of thirteen travelled 150 measured miles from ten o'clock of one day to half-past three o'clock in the afternoon of the next; and he came in so fresh that he could have travelled without fatigue at least thirty miles further that evening. The Gros Ventres made their marches exactly as I had desired, and reached the new council ground at the mouth of the Judith the very morning which had been appointed, being the first of all the bands and tribes. Our examination of the Yellowstone tended to verify the accuracy of Lewis and Clark's survey of it, and showed that in our previous maps we had laid the course of the stream too far to the south. I will refer in this connexion to three of the remarkable mountain men of that country, who were with me through this season's trip, and who had hunted and trapped on the forks of the Missouri and on the waters of the Yellowstone and its tributaries—the interpreter, William Craig, a Delaware Indian, also one of the Nez Percés interpreters, by the name of Jim, and a half-breed Shawnee, known as Ben Kizer, one of our Flathead interpreters. Ben Kizer and Delaware Jim both speak English, the first quite well; and they were exceedingly reliable men as interpreters, and remarkable as hunters and as guides. To show how Delaware Jim could lead a party, towards the close of our stay at Fort Benton, and before we moved to the Judith, I despatched our packmaster, Higgins, with the guide Legare, to some bands of the Nez Percés on the Yellowstone, who I was fearful might be compelled to go very far, perhaps even to the forks of the Missouri, in order to get meat. They had already suffered much from the want of food; we knew their general line of movement, and time was very essential to be saved in reaching their camp. Although the Delaware had not passed over this portion of country before—that is, the country from the Missouri to near the Yellowstone—yet so thoroughly was he possessed of the general knowledge of the Yellowstone country, and of the extreme upper portions of the Missouri and certain general ridges and mountain heights which would flank the route, that he undertook and actually did take the party on an air line to Clark's tributary of the Yellowstone, and, as I was informed by the whole party, struck their camps, hardly making a detour of a mile on the road. They also moved very rapidly, some fifty miles

a day. I will here remark, that I doubt whether such an express service as we were obliged to employ at Fort Benton to keep the Indians in hand was ever employed in this country with the same means. Many of our animals, which had done service all the way from the Dalles, travelled at express rates more than a thousand miles before we started on our return from Fort Benton. Many of our mules travelled from seven to eight hundred miles with packs, in going to the boats for provisions and to the hunting grounds for meat: and yet, after our treaty was concluded and we were ready to move home, we were able to make very good rates with these same animals, although the season was so late as November.

I had forgotten to mention in the proper place that, whilst at Fort Benton, I examined the Missouri towards the mouth of the Marias, and especially a very narrow place, called the Cracon-du-Nez, separating the Teton from the Missouri. This place is only about one hundred yards wide, and will require simply that length of cutting to bring a railroad line from one river to the other. The Teton valley was only about forty feet higher than the corresponding valley of the Missouri, and there will be no difficulty in adjusting an easy grade.

RETURN FROM THE BLACKFOOT COUNCIL.

We got through with the Blackfoot treaty, everything having succeeded to our entire satisfaction, and, indeed, beyond our most sanguine expectations. The greatest delight and good will seemed to pervade the minds of all the Indians, and we left them at the mouth of the Judith on our way to Fort Benton, and proceeded thence to the waters of the Pacific, rejoiced that our labors had had such a consummation. I do not propose to give a detailed narrative of my return trip, but simply to refer to such points as may be necessary in my purpose of presenting the character of the country. I had intended making many observations and examinations on my way back, in the way of detail, with a view of perfecting the information already gained, but the second day of my march from Teton my expressman, Pearson, reached my camp with information of the Indian war which had broken out in Washington and Oregon, and of the defeat of Major Haller. He brought me letters from official sources, stating that my only chance of safety was to go down the Missouri and return to the western coast by the way of New York. I remained in camp the following day, October 30, to make my arrangements to meet this unexpected condition of things; for my determination was fixed and unalterable that an attempt should be made to reach the settlements by the direct route, and that all dangers on the road should be sternly confronted. I sent back Mr. Doty to Fort Benton to get a large quantity of powder and ball, additional arms, and additional animals; put my force into camp awaiting his return, and at noon the next day, October 31, with Robie and Delaware Jim, we started to ride express to the Bitter Root valley. That night we camped on Sun river, having made a distance of some twenty-nine miles from about noon to sundown.

On the 1st of November we were in saddle at early dawn, pushed towards Cadotte's Pass, between the Crown Butte and Rattlers, passed by the Bird Tail rock, crossed the Dearborn, and went into camp four miles before reaching the divide, at a point which was the camp of Lieut. Grover and Mr. Robie in their winter trip of 1854. This evening a snow came on about an hour before sundown, or we should have crossed the divide that night. The weather in the morning was clear and beautiful, but, as we had no tent, we built up a large fire in order to dry ourselves, and got breakfast before leaving camp; and at half past eight o'clock we were on the road. There were some six or seven inches of snow on the ground, but the weather was extremely mild, and the snow was rapidly passing away. I went up the divide on the ravine

north of the usual trail, and was able to find a very good route for our animals. There was little or no snow on the western slope of the divide; continuing down the Blackfeet valley $5\frac{1}{3}$ miles, the snow was only an inch or two deep, and entirely passed away before we reached Lander's Fork. I will here observe, that Mr. Doty with the train crossed the divide some six days after us, and found not a particle of snow on the trail. We halted at Lander's Fork for a few minutes to rest our animals; then moving very rapidly through the Belly prairie and cañon, we came out on the large prairie of the Blackfoot at a little after dark, camping where I had camped with Lieutenant Donelson in 1853. The next day we were in the saddle early, and, moving over this prairie at a very rapid rate, ate breakfast at a point some eighteen miles from our morning's camp, and made our evening's camp within about ten miles of the Hell-Gate crossing to Fort Owen. The next day we reached Fort Owen, meeting at the Hell-Gate crossing some Indians, by whom I was able to communicate with Dr. Lansdale, who had preceded me to the Bitter Root valley, under instructions to confer with the Indians, to the end that if they desired to make a treaty at this time, I would meet them for that purpose. This rapid trip from the Teton to Fort Owen in the month of November shows the practicable character of the country; and I have referred to it rather in illustration of the fact that I had the opportunity of making a comparison of the approaches of Cadotte's Pass with those of Lewis and Clark; having observed and seen both carefully, the former twice. On our way to Fort Owen we had met a Nez Percés delegation on their way home, and had made arrangements to meet them at the crossing of Hell-Gate, in order to confer about difficulties ahead. After waiting a day at Fort Owen, I moved down to and established my camp at Hell-Gate, to await the arrival of Mr. Doty. I was here able to gain no additional information of the condition of the Indian tribes between the Cascade mountains and the Bitter Root, but the reports were that all were in arms except the Nez Percés, a large portion of whom were said to be disaffected, and some of them even hostile. I now purchased every good mule and horse that I could get in this valley; for it was my determination to endeavor to have my whole command in a position so that they could move rapidly and act promptly. The question was, what should be our route home. It was important, it seemed to me, to our success that we should be able to cross the mountains and throw ourselves into the nearest tribes, without their having the slightest notice of our coming. I felt a strong assurance that if I could bring this about, I could handle enough tribes and conciliate the friendship of enough Indians to be sufficiently strong to defy the rest. There would certainly be no difficulty from the snow down Clark's Fork; but it was known that the upper and lower Pend d'Oreille Indians were along the road, and no party could travel over it without its approach being communicated to the Indians; whereas Indian report had it that the Cœur d'Aléne pass was blocked up with snow at this season of the year, and I felt satisfied that they would not expect us on this route, and therefore I determined to move over it. It was the shorter route of the two; it was a route where I desired to make additional examinations; it was a route which enabled me to creep up, as it were, to the first Indian tribe, and then, moving rapidly, to jump upon them without their having time for preparation. I knew that Kamiakin and Pu-pu-mux-mux had sent a body of warriors to cut off my party; and that we had to guard aginst falling into an ambush, but an Indian has not patience to wait many days for such a purpose, and I thought, looking to all these things, that the line of safety was to move over the Cœur d'Aléne pass. Mr. Doty arrived at Hell-Gate on the 11th day of November, and after waiting until the fifteenth to make the necessary arrangements with Dr. Landsale, whom I left in charge of the Flathead Indians, with my friend, John Owen, and the Jesuit missionaries, I pushed down the Bitter Root valley. I need not go into the

details of the trip, except to say that my party, almost without a single exception, apparently looked upon the undertaking as a very desperate one, but still they were cheerful, obeyed every order with great alacrity, and enjoyed themselves very much in the evening's camp. We crossed the Bitter Root mountain on the twentieth day of November, the snow being three feet deep, and reached the creek at its western base a little before dark—too late to go to good grass, known to be some six miles beyond. This was the only night that we were without grass. The next morning I directed Mr. Doty very carefully to examine the upper waters of this Cœur d'Aléne creek, while I with the party moved on to grass and waited for him another day. In two hours we were in good grass, with fine water—a fine range for animals. They were now a good deal exhausted, for we had moved rapidly with the train from the Teton, and I determined to wait there another day to recruit. From the appearances of all that surrounded us, I was satisfied that there were no Indian runners on the lookout for us. On the twenty-third day of November we raised camp, made a good day's journey, and camped near our old camp in June. We were now about twenty-five miles from the Cœur d'Aléne Mission. It was impracticable for me to take the whole train in in one day without breaking down our animals; so, with Pearson and Craig, and four Nez Percés, I started at daylight, determining to reach that tribe that day, and leaving directions for the train to come in the following day. So we pushed on very gently and quietly at first, and when we came within sight of the Mission and the Indian village we moved rapidly, throwing ourselves into the midst of the Indians, and with our rifles in one hand, and our arms outstretched on the other side, we tendered to them both the sword and the olive branch. They met us all very cordially; every Indian left his lodge and gathered around us. I had told the four Nez Percés, "when you reach the Cœur d'Alénes, talk to them Blackfoot; tell them about our great council and treaty at Fort Benton; tell them that they can hunt buffalo without being disturbed by their hereditary enemies, the Blackfeet; tell them that the lion and the lamb have laid down together; get their minds off their troubles here, and turn them to other subjects in which they take an interest." It is enough for me to say that we established the most cordial relations with the Cœur d'Alénes. We found that the emissaries of the Yakimas had only left that point some four or five days, having despaired of our crossing the mountains. The train came in the next day, and I now determined to push on to the Spokane, having first despatched from the Cœur d'Aléne Mission Craig and a part of the Nez Percés home to that country to bring them into council and to make arrangements for moving below to the Dalles. Moving from the Cœur d'Aléne Mission on the twenty-seventh day of November, I made our first camp at the Wolf's Lodge, some nineteen miles from it, and the next day made a forced march, moving forty miles to the Spokane country. We met Polatkin, one of the principal chiefs of the Spokanes, on our way, and were at Antoine Plante's before dark. Here I found some of the miners from Colville. Before midnight Indian expresses were on the road to the lower Spokanes, to the Colville Indians, and thence to the Okinakane and to the lower Pend d'Oreilles, asking them to come and meet me in council at that point. I also requested Mr. Angus McDonald and the Jesuit fathers at Colville to visit my camp. We remained on the Spokane nine days, and I had there one of the most stormy councils for three days that ever occurred in my whole Indian experience; yet, having gone there with the most anxious desire to prevent their entering into the war, but with a firm determination to tell them plainly and candidly the truth, I succeeded both in convincing them of the facts and gaining their entire confidence. At this council were all the chiefs and people of the Cœur d'Alénes and of the Spokanes—the very tribes who defeated Steptoe the past season, the very tribes who have met our troops since in two pitched

battles; and I feel that I can without impropriety refer to the success of my labors among these Indians, backed up simply with a little party of 24 men. When our council was adjourned, the Indians gave the best test of their friendship and affection, by each one coming to lay before me his little wrongs and ask redress. They came in a body and offered me a force to help me through the hostilities of Walla-Walla valley and on the banks of the Columbia, which I declined, saying that I came not among the Spokanes for their aid, but to protect them as their father.

I now determined to move to the Nez Percés country, although on the Spokane the uniform feeling of the Indians was, that they were hostile and would try to get us into difficulty—a conclusion which seemed to be much supported by the fact that the Nez Percés chief, the Looking Glass, who had accompanied me to the Spokane, endeavored to betray me there. This little incident will serve to explain to what expedients one has to resort in these cases of difficulty. I had made a forced march to the Spokane. The Looking Glass came in the next day. I saw from his countenance that something was wrong with him, and I immediately got a half-breed interpreter, in whom I could trust, on the track to overhear his conversations. That interpreter kept about him, and finally overhead a long conversation between the Looking Glass and a prominent Spokane chief, in which the Looking Glass proceeded to develop his plan to entrap and deceive me in his own country, amid the Nez Percés, and in which he advised a similar course to the Spokanes. I never communicated to the Looking Glass my knowledge of his plans, but, knowing them, I knew how to meet them in council; I also knew how to meet him in his own country, and it gave me no difficulty. In order, however, to be prepared for all possible contingencies, I exchanged all but four of my horses for the best horses of the country, giving in exchange the Indian goods that we had brought up for the contemplated Spokane council, and when I moved from the Spokane I had with me the best train of the season. I reduced transportation to twelve days, and the packs to eighty pounds, for I desired to be in a condition that if the Nez Percés were really hostile, and I was not strong enough to fight, I could make a good run, and then I struck for the Nez Percés country. The second day I met an express from Craig's, telling me that the Nez Percés were all right, and that the whole tribe would back me up. We moved towards Lapwai, and were four days in reaching that point, the distance being 108 miles. The weather was very disagreeable, being snowy and rainy. In about fifty miles from the Spokane we got upon our old trail to the Red Wolf's ground, which trail we followed for about twenty miles, and then keeping to our left, passed to the mouth of the Lapwai, and thence to William Craig's place, on that stream. The banks of the Spokane, and pretty much the whole route from the Kamas prairie of the Cœur d'Alénes, is very well wooded; and the route towards Lapwai, for the whole distance, passes in the vicinity of a very well wooded country, except for about fifteen miles before reaching the Kooskooskia. My object not being to give an account of my Indian operations or of the Indian war, I will close my narrative at this point, referring you to my official reports should further information be desired in connexion with this trip. I will state that on my way into the settlements I remained in the Walla-Walla valley some ten days, where I saw much of the Oregon volunteers. Went to the Dalles, in advance of my party, with three men, and, the river being closed by ice, went down from the Dalles to near Vancouver on the trail, and reached Olympia on the 19th of January. I intend at some future day to give a very full account of these large operations in the Indian service.

GEOGRAPHICAL MEMOIR.

CHAPTER XIII

WATER LINES.—EASTERN AND WESTERN SLOPES.—MOUNTAIN RANGES.—NAVIGABILITY OF THE UPPER MISSISSIPPI.—RED RIVER OF THE NORTH.—COUNTRY WEST OF THE SHYENNE TO MOUTH OF YELLOWSTONE.—MISSOURI AND ITS TRIBUTARIES.

General Remarks on the Route near the Forty-seventh and Forty-ninth Parallels.—Water Lines on Eastern Slope: The Missouri; the Yellowstone; the Saskatchawan; the Peace River; the Red River of the North.—On the Western Slope: The Columbia; the Snake and Fraser's River.—Importance of the Great Lakes.—Mountain ranges dividing the tributaries of the Columbia and Missouri: The Rocky, Bitter Root, Cœur d'Aléne, and Koutenay Mountains; the Cascade Mountains.—Navigability of the Upper Mississippi.—Falls of Saint Anthony.—Sauk Rapids.—Western Branches of the Mississippi: Crow Wing River, Sandy Lake, and Pakegon Falls.—The Lakes between Mississippi and Red Rivers.—Eastern branches of Mississippi: Rum River; the Saint Croix; the Minnesota.—Water Line between Fort William, on Lake Superior, and Lake Winnepeg.—Advantages of Minnesota for railroad and water communication; abundance of timber; fertility.—Red River of the North.—Its tributaries: the Shyenne; Wild Rice River; Bois de Sioux River.—The Côteau des Prairies Plateau.—Dead Colt Hillock.—The region of the Bois de Sioux, the Shyenne and the Red River of the North.—The country west of the Shyenne to the mouth of the Yellowstone; the Côteau du Missouri; Miniwakan Lake.—Salt Lakes.—Mouse River and its valley.—The western part of the Côteau.—Mouth of the Yellowstone.—Missouri River.—Its origin.—Gate of the Mountains.—The Great Falls.—Fort Benton.—Characteristics of the river.—Its tributaries on the north and west shore.—The Big Muddy River.—Milk River.—The Bear's Paw.—Little Rocky Mountains.—Marias River and its valley.—The Teton.—Sun River.—Dearborn River.—Little Prickly Pear Creek.—The Jefferson, Madison, and Gallatin Forks.—Its tributaries on the south shore.—Muscle Shell River.—Judith River.—Arrow River.—Shonkin River.—Highwood River.—Belt Mountain Creeks.—Smith's River.—Landmarks: Highwood, Girdle, and Judith Mountains.—Buttes.—Soil of the Plateau.—Prairies at the Three Forks.

GENERAL CHARACTERISTICS OF THE COUNTRY DESCRIBED IN THE MEMOIR.

I now propose to present the following geographical memoir of the country along and in the general vicinity of the field of exploration of the northern route. Some significant facts will also be presented as regards the country both to the north and the south of this field. If we examine a map of the country we shall be struck by the fact that the line of the forty-seventh parallel is central to a vast region of the temperate zone, extending from the water line of the great lakes to the shores of the western ocean; that north of this route there is a vast area which, in similar latitudes in Eastern Europe and in Asia, is habitable, productive, and, at this very moment, increasing in population. Besides these advantages, it is intersected by the only streams flowing either side of the water sheet of the continent of which any considerable use can be made for purposes of navigation. On the eastern slope, the Missouri, having its rise in many tributaries so graphically and truthfully described by Lewis and Clark, in about latitude forty-four and forty-five, with other tributaries flowing from different points of the rocky ridge, as far, nearly, as our northern boundary; its principal tributary being the Yellowstone, which, with numerous branches, has its rise in the Wind River and lower mountain ranges to the east, their combined water flowing eastward and southward to its junction with the Mississippi until they find their final outlet in the Gulf of Mexico. The Saskatchawan, flowing eastward also in two main branches having their source in about parallels fifty and fifty-two, with tributaries coming a short distance from within our own borders, runs a great distance eastward, until, forming one stream, they flow into the waters of Lake Winnepeg, connecting northward with Hudson Bay. The Peace river, having its rise also near the parallel of fifty-three, flows

finally into the Frozen ocean. Again, this domain has within itself the sources of the Mississippi, which, with its numerous tributaries, has a long course to the southward before joined by the waters of the Missouri; the Red River of the North, having its source in the very heart of Minnesota, not far from that of the Mississippi, and finally, with its numerous streams, some coming from the east, some from the south, and some from the west, flows more than four hundred miles northward within our own borders, and three hundred and sixty miles northward still, until it joins the waters of Lake Winnepeg. Except the immediate field of my own explorations, of which a minute description will be given, I propose to describe only in general terms the country from the parallel of the city of Washington and San Francisco to Hudson Bay, the region alluded to, and to which the northern route is central. Whenever it may become necessary, I shall avail myself of other sources of information which may seem to me to be reliable.

The western slope of the continent, on this extended field, has but one large navigable river, the Columbia—a name most grateful to the ears of the American people, from the fact of its having been discovered by an American shipmaster. The Columbia, with its great southern tributary, the Snake river, drains an immense country, stretching from the 42d to the 53½d parallel. It has several tributaries, each affording more continuous navigation than any other stream on our western coast, except the Sacramento and the Colorado. Northward the rivers generally are unnavigable; for Fraser's river, flowing to the ocean in about parallel 49° 07′, is navigable only 120 miles. The upper half of this distance is difficult at all seasons of the year. Now, these two great rivers, the Columbia river and the Missouri, are on the direct line of the northern route, are central to the great regions under examination, and are navigable by steamers to points only from 450 to 500 miles apart. If this great provision of nature be seconded by other auxiliaries and other bounties from the same hand, we have, added to the advantages of central position, a combination of natural gifts, which cause the route to be already almost prepared for the enterprise, the occupation, and the accomplishment of the great movements of the world. I have referred to the great lakes. The importance of these great lakes has now become second to that of no inland sea, either of the New or of the Old World. The extraordinary growth of cities on both their shores; the great grain ports, far exceeding the old grain ports of Europe; the great lines of railroad now in progress and rapidly approaching completion; railroads stretching through the Canadas, and now seeking their eastern terminus in the waters of the northeastern British Atlantic; the great lines of railroad stretching through the States, and already having termini at every point of commerce on our coast; the parallel lines in progress, still further to facilitate business and exchange—all show the vast, growing, commercial, and business interests around this great water line. This water line, moreover, has been improved by the people on both sides of the boundary. The genius of Clinton gave to New York her great canals many years ago. The Welland canal has enabled the Canadas to turn the Falls of Niagara, and the Sault St. Mary's canal has connected Lake Superior with the chain of lakes to the eastward; so that at this moment this water line, stretching halfway across the continent, has placed the extreme western parts of Lake Superior and Michigan in connexion with the ports of Europe. Vessels, without breaking bulk, can pass from those points to European ports; and yet new lines of canals are being projected to shorten the connexion between the Georgian bay and the waters of the St. Lawrence. This brief description of the general character of the region, as affected by water communications and in connexion with great existing railroad lines, is

here given before entering upon a detailed description of the country. I have not thought it necessary to refer particularly to the mountain ranges which intersect this country. The great rocky range, from the point where it commences to separate the tributaries of the Columbia and the Missouri, far to the northward of the 56th parallel, has a general course north 40° west. The divide commences on the 42d parallel, at the longitude of 109°, and wending westward to 123° longitude in the 56th parallel. In about parallel 45 a second backbone of the Rocky mountains leaves the main chain and courses a direction north 25° west, crossing Clark's Fork at the Cabinet mountain, and proceeding in the same general direction to the waters of the Koutenay. This chain is known as the Bitter Root, Cœur d'Aléne, and Koutenay mountains, and is considered and described by Lewis and Clark as a portion of the Rocky mountains. Between the Bitter Root mountains and the next range, known in California as the Sierra Nevada, and in Oregon and Washington as the Cascade mountains, is a great interior plain, denominated the plain of the Columbia, and which will be minutely described as we go on. The Cascade mountains have a general direction north and south, and are at an average distance from the coast of 120 miles. These mountains are generally high and rugged, having many snowy peaks, and with but one river stream from the Sacramento to far north of Fraser's river, which really breaks through the mountains from the interior plains. The mouth of the Columbia, and the waters of Puget Sound, the Georgian bay, and the Straits de Fuca, will be referred to hereafter; but for harbors, the western terminus of this route, central to such a vast geographical area in the temperate zone, and central to the great water lines, canals, railroads, and seats of commerce of the eastern slope, is the most splendid roadstead, admitted in the opinion of all military and naval officers, and all commercial men, on the shores of all the oceans.

UPPER MISSOURI AND GREAT LAKES TO RED RIVER OF THE NORTH.

But to resume: This scheme of railroad connexions for the northern route connects with Lake Superior at its western end, and the waters of the Mississippi at St. Paul, the head of continuous steamboat navigation; and also on its western terminus there is a connexion both with the Columbia valley and the Puget Sound, over the Cascade mountains. Lake Superior is rapidly growing in importance. Its commerce, and particularly its steamboat business, more than double every year. Superior City, which is the most western point, has a large and capacious harbor, where the coming season steamers will arrive daily. Bayfield, on its southwestern shore, has also very extensive space for the secure anchorage of vessels, and, equally with Superior City, will soon be in railroad communication with the waters of the Mississippi. The Mississippi itself, above St. Paul, has flowing into it many tributaries having reaches of navigable waters. Even as long ago as 1853 steamers were running from Saint Anthony to Sauk Rapids.

The first obstruction to continuous navigation of the Mississippi is the falls of St. Anthony, situated 10 miles above the mouth of the Minnesota, in latitude 45°.

From above this to Sauk Rapids is 90 miles, and in sixty miles further occur four more rapids, which may, however, be easily removed, as they consist only of loose boulders, thus giving another long extent of navigable waters. Crow Wing river, which empties at this point from the west, has no obstruction except from movable boulders, and has a depth of at least four and a half ($4\frac{1}{2}$) feet up to its principal branch, Leaf river, a distance of about sixty miles by the windings, or twenty in a straight line. Leaf river decreases from four to two

and a half feet in depth, in a winding course of seventy-five (75) miles to its origin in Leaf lake, from which, to Otter Tail lake, the source of Red river, is less than two miles. Above the mouth of Crow Wing river the course of the Mississippi is straighter, and changes suddenly to a NE. and SW. course. For 75 miles only one rapid is met with, and here is the outlet of Sandy lake emptying from the east, from which to the navigable part of the St. Louis river which empties into Lake Superior at Fond du Lac is but 30 miles in a direct line.

A number of small rapids occur above this lake, but it is believed that navigation can be made by steamboats for at least 35 miles further, to Pakegon Falls, about 200 miles by the numerous windings of the stream from its source in Itasca lake.

On the west side the principal branch to the north is the Crow Wing, through which there is the best connexion with Red river. South of this occur the smaller streams called Karishon or Crow river and the Sauk, each navigable for considerable distances. The distance between the navigable waters of the Mississippi and the Red River of the North—I am now referring to the upper branches of the Mississippi, those above St. Paul—is but one or two miles; and the whole country, in that general region, has great facilities for canoe communication. Numerous lakes and streams are found upon its surface, many of which discharge, during high water, in both directions, so that the early voyageurs found no difficulty in moving on many lines in their light canoes, with comparatively inconsiderable portages.

Many of the branches are navigable at present for a considerable distance, thus affording excellent access to the fine timber which abounds in this region.

From the eastern side the principal branches are: the Rum, or Iskodewabo, and the St. Croix rivers; the latter, emptying fifteen miles below St. Paul, is continuously navigable for sixty miles towards the northeast, when its falls occur. Above these it is probably navigable for small steamers for seventy-five or eighty miles, or within sixty miles of Lake Superior. Near St. Paul the Mississippi receives the waters of the Minnesota, which have their source near those of the southern branch of the Red River of the North. Big Stone lake, the source of the Minnesota, is only three miles from Lake Traverse, the source of the Bois de Sioux, tributary of Red river. Then, about latitude 45° 10′, its course suddenly changes at a right angle, and for the remainder of its course from its origin several falls and rapids occur. The Minnesota is now navigable by steamers to three hundred miles from its mouth; and it is believed that its upper portions can be so improved that, by a through-cut from Big Stone lake to Lake Traverse, there may be continuous navigation from the waters of the Mississippi to the Red River of the North, and thence to Lake Winnipeg. North of our boundary the existing communication from Fort William to Lake Winnipeg is one essentially by water; but the governmental party which made the examination last year, and which are now continuing their exploration in that country, recommend, in their official report, the establishing a communication between Fort William, on Lake Superior, and Fort Garry, on the Red river, partly by a wagon road and partly on the waters of the line referred to; which, in their estimation, will cost some $200,000. This view will show how extraordinarily well supplied with available streams and waters of communication is the country between the great lakes and the upper Mississippi, and thence to the waters of the Red River of the North. The State of Minnesota, in soil, salubrity of climate, and ability to support population, is not surpassed by any other portion of the North American continent. Its water advantages, in enabling its people to carry everything to market, are extraordinary. Its people are enterprising, and have taken up in good earnest the moving westward of the great lines of railroads which have not yet reached

their eastern border. The extraordinary increase of population in the northwestern States—of Wisconsin, of Iowa, of Minnesota, and of Illinois—is the most convincing evidence how much they invite settlement, and of their resources, as great elements of power, commerce, and wealth, in a mighty nation. In the State of Minnesota much is being done in the way of establishing good wagon roads. Individual enterprise will, by next July, have a very excellent road open from Superior City, by Mille Lacs, both to Madeira and to Crow Wing; and from Crow Wing the line will soon be taken up to the western border of the State. There is a road connecting Superior City with St. Paul. There is a pretty good natural road from St. Paul to the navigable waters of the Red River of the North. So we find both water lines and wagon roads to move through and occupy this State. Much of the larger portions of Minnesota, from Lake Superior to the Red River of the North, is heavily timbered. Here are very large pineries; groves of oak, and elm, and ash, and maple; there are also the linden, cherry, beach, ironwood, birch, cottonwood, spruce, hemlock, tamarack, arbor vitæ or white cedar, and red cedar, in abundance, and fifteen other kinds of trees of less importance; of the maple there are four; of ash, two; elm, three; oak, six; birch, two; cottonwood or poplar, three; pine, four; and of spruce, four distinct species, varying in properties and appearance—making the timber trees thirty-four varieties. The soil is uniformly good. Winter wheat is raised with great success. E. Patch, a few miles north of the Falls of St. Anthony, raised, two years ago, forty bushels to the acre; it yields largely as far north as the 48th parallel. Corn is a certain crop as far north as 48°, and is raised north of 49°. The southern corn, commonly called the gourd seed, is generally cultivated as far north as Sauk Rapids. Near St. Paul, sixty bushels have been raised to the acre. In no country do potatoes do so well, yielding commonly from 200 to 400 bushels to the acre. The southern part of the State is strictly an agricultural region; the soil is a rich, sandy loam, with a clay sub soil, and extends as far north as the Crow Wing river, where the pine belt commences, which follows up the Mississippi and its tributaries to their sources, with occasional intervals of maple, oak, spruce, birch, &c., &c., at Red, Leach, and Cass, and at the lakes, corn, wheat, and all other kinds of vegetables are raised.

The past year the citizens exported hundreds of thousands of bushels of oats and potatoes, also a small quantity of wheat.

The valley of the Minnesota river is thickly settled, and the land yields all kinds of grains and vegetables. From this valley to the Red river, and from the latter, by the Otter Tail lake, to the Mississippi river, thence to Crow Wing, thence south to the northern line of Iowa, the country is thickly settled.

Minnesota is surpassed by no portion of the country for grazing purposes; the rich growth of wild grass everywhere to be found, the dryness of the atmosphere, and the lateness of the frosts in the fall, together with the small quantity of snow that falls during the winter, particularly adapts that State to the honor of the farmer and stock grower. The valley of the Red river as far north as the 51st parallel is rich, and produces wheat, barley, oats, potatoes, and vegetables, equal to any part of New York. Land in the vicinity of St. Paul has yielded ninety bushels of corn to the acre. Tobacco does well, and from the last year's experience, it is believed that Minnesota will be able to compete with any of the tobacco-growing States of the Union. Sweet potatoes are raised in great abundance, and to be found in the principal market-houses. The western coast alone can compete with this State in raising vegetables. The

Isabella, Catawba, and Clinton grape do well; large vineyards have been started. Wild apples, plums, and grapes everywhere abound, and it is believed that cultivated fruits will flourish; but as the smoke is yet issuing from the camp fires but recently deserted by the Indians, time has not been given to test its adaptation to the raising of fruit; 200,000 industrious whites now inhabit this State, which ten years ago had not fifty white families within its limits. What better test can be required of its adaptation to the wants of a laboring population? Iron ore is abundant, and in the northeastern portion of the State copper, silver, and other ores are found. Thus, looking to Minnesota alone, we have in the general vicinity of the northern route an area of 83,000 square miles, furnishing at least 53,000,000 acres of arable land, where all the vegetables and all the cereals obtain the highest perfection, and over a large portion of which the Indian corn also thrives.

PLATEAU OF THE BOIS DE SIOUX

The Red River of the North receives from the west many tributaries, of which the most important is the Wild Rice river, the Shyenne, the Maple, and Elm rivers. The Shyenne has its source near the 101st meridian, flows generally on a due east course about three degrees, then making a great bend to the southward from 47° 40′ of latitude, courses eastward along the parallel of 46° 40′ until it joins the waters of the Red River of the North. These rivers may be described as follows: Wild Rice river, the next towards the east, arises south of the great bend of the Shyenne, and at the border of the Côteau des Prairies, then flowing in a winding course towards the northeast for about a hundred miles, joins Red river in latitude 46° 48′. The Bois de Sioux also arises at the foot of the côteau, in a lake twelve miles long, called Lake Traverse, and after a course of thirty-five miles nearly straight towards the N.NE., joins Red river at latitude 46° 20′.

Lieutenant Pope found the average depth of this branch three feet, so that there seems to be no obstacle to a communication through it with the Minnesota, if a connexion is made between Lake Traverse and Big Stone lake above the mouth of this branch. Red river has a depth of from 2½ to 4 feet, and is often called the Otter Tail, from the name of the lake in which it rises thirty miles nearly due east. These three streams uniting form a body of water but little larger than the Shyenne, with which it unites about latitude 47° 10′. Thence the course of Red river is nearly north until it crosses the boundary, and its depth increases from four to fifteen feet, the whole navigable distance from Lake Traverse being 462 miles, though it does not continue so for more than eighty miles north of latitude 49°, where falls and rapids occur.

Two of the most important landmarks west of the general region of the Bois de Sioux are the Côteau des Prairies and the Dead Colt Hillock, the former of which is described by Nicollet as follows: The basin of the Upper Mississippi is separated from that of the Missouri by an elevated plain, the appearance of which seen from the valley of the St. Peters, (Minnesota,) or that of the Rivière à Jacques, looming as if it were a distant shore, has suggested for it the name of Côteau des Prairies. Its more appropriate designation would be that of plateau, which means something more than is conveyed to the mind by the expression a plain. Its northern extremity is in latitude 46°, extending south to 43°; after which it loses distinctive elevation above the surrounding plains and passes into rolling prairies; its length is about 200 miles, and its general direction N.NW. and S.SE.

Its northern termination (called Tete de Côteau, in consequence of its peculiar configuration) is not more than fifteen or twenty miles across; its elevation above the Big Stone lake is 890 feet, and above the ocean 1,916 feet. Starting from this extremity the surface of the plateau is undulating, forming many dividing ridges, which separate the waters flowing into the St. Peters and the Mississippi from those of the Missouri. Under the 44th degree of latitude the breadth of the côteau is about forty miles, and its mean elevation is here reduced to 1,450 feet above the sea.

The côteau itself is isolated in the midst of boundless and fertile prairies extending to the west, to the north, and into the valley of the St. Peters. Dead Colt Hillock is one isolated butte standing north of the extremity of this côteau, and probably at one time connected with it, as it has the same general structure. This butte was not measured, but others further west were found to rise 200 feet above the valley. The general region of the Bois de Sioux is very remarkable. It is a very extensive plateau, partly prairie and partly wooded, with a beautiful timber growth on the streams which intersect it, that separates the waters flowing into Hudson bay from those flowing into the Gulf of Mexico; and yet the divide is not perceptible to the eye. It is the natural key of railroad communications through Minnesota; and yet the Côteau des Prairies, which may be said to be its southern limit, is both a landmark and a barrier. The country between the western branch of the Shyenne and the Red River of the North is unsurpassed for pasturage, furnishes a large portion of arable land, and yet to its limits is at times rolling and hilly, and a portion of the land is of inferior quality.

BOIS DE SIOUX TO MOUTH OF THE YELLOWSTONE.

Westward from the region just described to the mouth of the Yellowstone, there are some general features which I will first refer to. The Côteau du Missouri stretches along the northern side of the Missouri river separating its waters from the northern system of waters which have their outlet in Hudson bay. It presents to the eye of a voyageur the appearance of a distant coast, and so easy and practicable is it that one can move with heavy trains over nearly all portions of it. This côteau, in the vicinity of the Yellowstone, passes to the northward and westward into British territory, and, continuing westward, finally blends itself in the projecting spurs and main chain of the Rocky mountains, separating again the waters of the Missouri from the waters of the Saskatchawan. A great feature of the intermediate country is the Miniwakan, or Devil's lake. This lake is on the plateau of the Shyenne, and is surrounded by swells and hills, varying in height from 20 to 250 feet.

The greatest extent of the lake is at least forty miles, but may be more, and is bordered on its south side by hills which are pretty well wooded. It is so filled up with islands and promontories that in travelling along its shores it is only by occasional glimpses that its great expanse is visible.

Its average breadth may be set down at fifteen miles, and its waters appear to be the drainings of the surrounding hills. It has no outlet towards Red river except by a depression, by which in high water it may possibly discharge itself into the Shyenne.

Its water is too brackish to be drank except by horses, which swallow it with avidity, and its color is a deeper green than the neighboring lakes, which are not salt. By analysis they were found to contain sulphates of soda and of magnesia, (epsom and glauber salts,) and chlorides of soda (common salt) and magnesia.

Large fish of several kinds inhabit it.

In the vicinity of this lake and to its southward are many salt lakes, and there are from time to time saline effervescences on the soil; but there are always numerous ponds of fresh water, and my own experience and that of the voyageurs of the country is, that fresh water will always be found, at short distances apart, either for camps or for the use of settlements. The country immediately to the southwest of the Miniwakan lake, and in the general vicinity of this saline region, is the most indifferent that is met with coming from the east. The James river has its source near the eastern border of this region, in about latitude 47° 40′, and flowing in a southerly course finds its way to the Missouri a great distance above its confluence with the Mississippi. From the head of James river to the nearest point of Mouse river is seventy-five miles. Mouse river has its source in British territory, flows below our boundary a hundred miles east of the meridian of the Yellowstone, finally reaches nearly to the 48th parallel, and then, flowing to the northwestward, joins its waters with those of the Assiniboine river, which again flows into the Red River of the North. The Mouse has no considerable tributaries from the south, and the information which Lewis and Clark derived from voyageurs that its source was within one or two miles of the Missouri is erroneous. From the Côteau du Missouri a great many little streams trickle down, gather up water, and pass into Mouse river; but it has between it and the côteau a broad, open, beautifully grassed valley, with plenty of wood in all the coulées which border these numerous streams. Opinions differ on the part of voyageurs as to whether Mouse river is to any considerable extent navigable, but all concur in the judgment that there is a large quantity of fine arable land to the north, and they all speak of the heavy forest growth in its general vicinity, known as the Bois de Chippewas. In the Mouse River valley is found the trail from the Pembina settlement to the mouth of the Yellowstone. This portion of country is described by the voyageurs, many of whom I met and conversed with concerning it, as being well grassed, well watered, and a large part of it well adapted to farming. This is notoriously the case with the country on the Assiniboine in immediate connexion and to a short distance north of it. Indeed, there is but little country between the Red River of the North and the Mouse River valley which is not adapted to almost continuous settlement; for I hold that when a country is so well watered, and its arable and grazing lands are in such connexion, small farms can be opened over nearly the entire surface for the sustenance of man; that such a country is a cultivable country. The term small farms is used in contradistinction with large farming operations or plantations where the owner has to employ many hands. I have to say, therefore, that over this country you can plant farms of from 160 to 640 acres, furnishing all the arable and grazing land required to make agriculture profitable.

The Mouse River valley has a general elevation of 1,400 to 1,800 feet, being about the same height with the corresponding valley of the Missouri. Its most western tributary is the River of the Lakes, which passes along the northern side of the Côteau du Missouri, and furnishes a line of gentle ascent to cross the côteau. On this tributary are found specimens of lignite. The côteau itself, between the Mouse River valley and the mouth of the Yellowstone, has a height of about from 200 to 400 feet above the former valley, and its general width may be estimated at 35 miles. The country immediately north of Fort Union to the White Earth river is much of it of a very indifferent character, furnishing some grazing. The grazing, however, gradually improves, and is quite good for twenty to thirty miles below our parallel. None of the streams in this general vicinity, the White Earth river, the Sandy creek, and the Little Muddy, are navigable, and on their banks are but scattered groves of wood. They are almost entirely

dried up in the summer season, affording, however, water for camping purposes. There are some lakes in this genial region, and many in the côteau itself. The voyageurs of the country state that there are numerous lakes all along the côteau as far as James river, and it is unquestionable that they will supply any deficiency of water along the salt water region south of the Miniwakan lake. There is no doubt, however, that this portion of the route can be readily supplied by means of artesian wells. It may be estimated that fifty miles of the country on and in the neighborhood of this côteau is not continuously cultivable. There are through it, as in the region referred to south of the Devil's lake, many spots of good land, in the valleys of the streams, on the shores of the lakes, and in the hollows and depressions of the country.

The mouth of the Yellowstone is a great landmark throughout this whole country, and, in geographical position and importance, is worthy of special mention. Here the two great branches of the main trunk of the Missouri come together; to this point, and sometimes above it, steamers of from four to six hundred tons have come from St. Louis every year for the last twenty-five years; and it may become hereafter a depot for supplying the Salt Lake, by the line of the Yellowstone, which is navigable for boats, and possibly for steamers, to above the mouth of the Big Horn, a distance of about two hundred miles. The character of the Missouri above Fort Union will be referred to more specifically hereafter. It may be said here, however, that its waters are navigable for steamers to within less than one hundred miles of the divide of the Rocky mountains.

The general region of country described thus far is between the 92d and the 104th degrees of longitude, an air-line distance east and west of 575 miles. The dividing ridge of the Rocky mountains and the scope of country included within the purview of the northern route is in the 112th degree of longitude, on the parallel of 46°, taking a northwesterly direction to the 115th degree of longitude, in parallel 49°.

MOUTH OF THE YELLOWSTONE TO ROCKY MOUNTAINS.—DESCRIPTION OF THE UPPER MISSOURI RIVER AND ITS TRIBUTARIES.

The Missouri may be described as follows: It has its source in three main tributaries, the Gallatin, Madison, and Jefferson forks, between the 44th and 45th parallels. These streams, by their junction, form the Missouri, in about latitude 45° 24′, and longitude 110° 40′. Thence the general course of the Missouri is northward, ranging within from twenty-five to sixty miles of the divide of the Rocky mountains, when it breaks through a somewhat difficult projecting spur of the same, at a point denominated by Lewis and Clark the Gate of the Mountains; continuing then to the northward, and soon varying to the eastward, we come to its Great Falls, which may be described as follows: They consist of five principal cascades, commencing three miles below the mouth of Sun river, and extending for 11½ miles, with intervals of rapids between them. The entire fall amounts to 160 feet, and varies from 5 feet at the second pitch to 76 feet in the last, the first being 25, the third and fourth 42 and 12 feet, respectively, so that the increase is nearly in geometrical progression from the least to the greatest.

The banks are high and abrupt on both sides, intersected by ravines, but opposite the fall on the north side a strip of rolling prairie runs near the river and breaks off in terraces to a small bottom below the cascade, from which to Fort Benton a passage along the river bank can be made practicable by cutting through some projecting bluffs. Thence its general course is nearly due east, until we reach Fort Union. From the Great Falls to Fort Benton, a distance of 30 miles, it gradually widens; and here are more and larger points of bottom land on its banks, to Highwood

creek, which flows into it from the south 15 miles below the Great Falls. The Highwood has a large extent of fine arable land suitable for a military post, and is probably about the head of navigation. About five miles below the fort there is a rapid having but fifteen inches of water—this is the shallowest point—the next being twenty inches deep, and varying from this to twenty-six inches. Two or three points occur where there are large movable rocks, until the mouth of the Muscle Shell is passed.

This is especially the case at Dauphin's rapids, 16 miles below the mouth of Dog river, where, in addition, there is a current of 4½ miles per hour. The current is stronger here than at any other point on the river. This refers to the river between the 20th and 30th September; earlier in the season, when the tributaries are supplied from the melting of the snow in the mountains, its depth is much greater; in the month of June it has three feet more water; from the first of August to the middle of September it falls very gradually; and upon the first of September its depth is about one foot greater. This rise and fall of the river is very regular, and it is but little affected by the accidents of the weather. During the high water the current is very rapid and severe, and the small rapids are lost sight of. As to the large rocks sometimes found in the channel, they are brought from high up the river by the ice as it goes out when the river breaks up. During the winter they become attached to the under surface of the ice, and in its removal they are taken along till they are rubbed off by some gravel bar, or fall down by the melting of the ice; the next season, if on a bar and near the surface, they again become frozen up with the ice, and are moved further down. Thus they are constantly working their way down the river, and a bar that this season is encumbered by them may be free the next. From the Muscle Shell downward towards the mouth of the Yellowstone the river changes. The water gradually becomes muddy from the washing away of the banks; the channel is constantly shifting its position; the forests of cottonwood with which the banks are lined, falling into the river, causes numerous snags and sawyers. Below the Yellowstone the Missouri assumes the same character it manifests to its mouth, it becomes thick and muddy with the alluvial deposit it is ceaselessly bearing on to the Gulf of Mexico. The bed of the river is much broader; the waters separate into many different channels, forming numerous sand islands, sometimes covered with forests of cottonwood. Referring to the navigation of the Missouri, it may be observed that, as regards the shallowest rapids, owing to the peculiar nature of the bottom, it being a mixture in many places of quicksand and fine gravel, it would give way very readily to the action of the paddle wheels, and admit of the passage of a boat drawing a greater amount of water than is actually found upon the bar. In order to take advantage of the rise of the water, the service should be so organized as to have two lines of steamers, one running from St. Louis to the mouth of the Yellowstone, and the other from that point to Fort Benton. The steamers which navigate the first portion of the river draw from three to four feet of water, and carry some five or six hundred tons of freight, and have ascended as high up as the mouth of Milk river. The navigability of the rapids could be so far improved, by removing the boulders and stones now obstructing the stream at the points referred to, that steamers drawing two feet of water and carrying from 200 to 250 tons could reach Fort Benton at the lowest stage of the river. This improvement would consist altogether in the removal of detached masses of rock, and could be easily done at low water and at small expense. The kind of steamers best adapted for the river are side-wheel steamers, with two separate, disconnected engines, as such boats will more easily turn the sudden curves than any other kind. The river from St. Louis to Fort Union has many snags in it, but during the 25 years the

American Fur Company have navigated it they have never lost a boat from that cause. From Fort Union to Fort Benton there are but few snags, and the only obstruction is the rapids. There is plenty of wood for fuel all the way from St. Louis to within 200 miles of Fort Benton, but within that distance, for a space of about 100 miles, wood is scarce, though it can be had at a few points. The river may be considered navigable through its whole extent for seven months of the year. The ice at the coldest section of the river, say from Fort Union to Fort Clark, on an average of a term of years, will commence making so as to obstruct navigation about the 20th of November, and would break up about the 10th of April. The distance from St. Louis to the mouth of the Yellowstone is 1,887 miles; to the mouth of Milk river, 2,067½ miles; to Fort Benton, 2,415 miles; to the mouth of Highwood creek, 2,430 miles; and to the Great Falls, 2,445 miles.

The Missouri has numerous tributaries from the north. Commencing at Fort Union, one of the most important is the Big Muddy, which has its rise probably near our parallel; has a course generally south, with a fine body of arable land on its banks, and finds its junction with the Missouri in the midst of a large forest of cottonwood. In 117 miles from Fort Union by the wagon road we reach the mouth of Milk river, after passing many tributaries between it and the Big Muddy. Milk river is described by Lewis and Clark, and has been laid down on all the maps until within comparatively a recent period as having a due north and south course, its source being in British territory; its course is nearly east; west for one hundred and eighty-five miles near the parallel of 48° 30′, and it affords a remarkable river valley, looking to its own resources, as well as a good approach to the mountain passes. The Milk river has several inconsiderable tributaries, both from the north and south; but it has its rise in the main Rocky mountain range immediately southeast of Chief Mountain lake, and between latitude 48° 50′ and 49° 15′, whence it flows a little to the north of east for about 100 miles, then, turning to the southeast in longitude 111° 45′, runs for 120 miles until it takes its eastern direction to the Missouri, which it follows for 85 miles, crossing the boundary in longitude 110° 30′ north of the line of the Missouri and Milk river to the divide of the Rocky mountains. The country is a rolling prairie; no mountain ranges are visible, except the Three Buttes, which rise up three thousand feet out of a plain one hundred miles east of the mountains, in about latitude 48° 50′. Between the Milk river and the Missouri there are two upheavals—the one is the Bear's Paw, which nearly fills up the country between these two rivers, 160 miles east of the divide, east of which is a less considerable upheaval—the Little Rocky mountains. The Bear's Paw is an exceedingly difficult country, although it is intersected by trails easy for pack mules, and said to be practicable for wagons, which are well known to the voyageurs of the country. The Little Rocky mountains, as well as the Bear's Paw, have an abundance of thrifty and available pine. They occur in localities and in bodies which will make it easy to supply the surrounding country. This region, from the Bear's Paw to the mouth of Milk river, between the Missouri and the Milk, is an exceedingly fine grazing country. It is well watered by the streams flowing into the Milk river and the Missouri. It is a great resort for game. The buffalo is found here in very large numbers, as well as on the Milk river itself. The Milk river, from the Bear's Paw to near its mouth, is both the summer and the winter home of the Gros Ventres tribe of the Blackfeet nation. This tribe numbered in 1855 two thousand five hundred and twenty souls, and owned, at least, three thousand horses. It is unquestionable that from Fort Union, all along the general region of the Bear's Paw, the country is generally cultivable. Locations can be made by small farmers throughout its extent, and a thrifty and

hardy population will grow up. There will be no difficulty about supplying such a population with water, or with wood for buildings, for the Missouri itself from the Gate of the Mountains can carry down the timber required for a considerable population. From the Bear's Paw to the Rocky mountains the great feature of the country is, first, the extension of the plateau to the base of the mountains, and the comparatively gentle and gradual approach which it furnishes; and, second, the extraordinary network of streams which, passing down from the main chain, form by their several junctions the southern tributary of the Saskatchawan, Milk river, Marias river, Teton river, Sun river, and Dearborn river.

The numerous branches of the Milk, Marias, Teton, and Sun rivers all have beautiful and fertile valleys, while, even in the mountains, numerous rich prairies are met with, and the hills themselves are often covered with a fertile soil. The character of the country is even better for agricultural purposes close to the mountains than further off. In the vicinity of Birch and Badger rivers it was beautiful, and even in May covered with a luxuriant green turf and numerous flowers, the soil being a dark loam. The main stream of the Marias came from a gap in the mountains, ten or fifteen miles in width, the valley partially timbered and partially rich prairie. This stream, evidently not the one explored by Mr. Tinkham, seemed to lead through the true Marias Pass; going up the valley for several miles, he still found it wide, and without any apparent obstruction towards the west, while the stream continued so deep that he found a ford with difficulty.

The valleys of the numerous streams he crossed, between Sun river and the upper streams of Milk river, occur so close together that there can be no deficiency of water; not only the valleys but a great part of the upland is arable. Sun river, with its south fork, called Elk Fork, eight streams running into the Teton, seventeen tributary to Marias, and ten sources of Milk river were crossed in this intervale of 140 miles, having each an intervale of from a half a mile to ten miles in width, with an abundance of excellent timber in close proximity.

Coursing along under the eastern base of the mountains, in the months of May and June, you constantly cross these little streams, having a volume of water, showing that they have a considerable course over a country much of it arable, and all decked out in the gayest flowers of spring. The Mo-ka-un, or Belly river, a tributary of the Saskatchawan, has its rise in Chief Mountain lake, under the 49th parallel, which is fed by several tributaries, whose most southern source is about latitude 48° 30′. About the Chief Mountain lake, in the neighborhood of these several tributaries and to the eastward, is much arable land.

Standing on one of the elevated mountain peaks near this lake, and looking to the northeast upon the country through which passes this tributary of the Saskatchawan, a vast plain, or more properly a prairie, is spread before the eye for more than fifty miles, for in richness of soil, luxuriant vegetation, and bright colored flowers, it closely resembles the prairies of the western States. The river next in size to the Milk, on the northwest side of the Missouri, is the Marias, which, rising in the Rocky mountains about latitude 48° 30′, runs a little south of east for about one hundred and sixty miles in a direct line, though much more by its windings, and empties into the Missouri eleven miles below Fort Benton. It is supposed to be navigable for small steamboats for fifty miles, forming the extreme of water communication towards the northwest in longitude 111° 30′. About a mile above its mouth it receives the Breast or Teton river, which, flowing from the mountains near latitude 48°, has a more winding but general easterly course for about one hundred and thirty miles, and is a smaller stream than the Marias. The next met with is Medicine or Sun river, which, rising also in the main range about latitude 47° 30′, pursues a

nearly direct course eastward for eighty miles, discharging into the Missouri three miles above the Falls. About fifty-five miles from its mouth it receives Elk Fork from the mountains a little south of west, up which a good approach can be made to Lewis and Clark's or Cadotte's Pass. Crown Butte creek is a stream not more than fifteen miles long, which rises near the hill of that name, and running eastwardly empties into a lake, together with a smaller stream from the south. Its outlet runs only a short distance and then sinks into the ground five miles from the Missouri, between Sun river and Beaver creek. The Dearborn, rising in the main chain, about ten miles southeast of Elk Fork, runs first northwestwardly for ten miles, and then turning to the southeast flows nearly parallel to the dividing ridge for twenty miles, receiving a tributary from both Lewis and Clark's and Cadotte's Passes, when it gradually curves round to the east, and twenty miles further empties into the Missouri near latitude 47° 09′. Two miles from its mouth it receives from the northwest Beaver creek, a stream not more than forty-five miles long, and running also nearly parallel to the dividing ridge. These two streams, together with the broken character of the country adjoining their lower portions, make an approach from the Missouri difficult above Sun river.

Twenty-eight miles southeast of Cadotte's Pass rises Little Prickly Pear creek, and, taking a crooked course towards the northeast for about twenty-five miles, empties into the Missouri thirteen miles above the Dearborn. Its valley forms a part of the approach from Fort Benton to the Hell-Gate passes. The principal Prickly Pear creek, however, rises by several heads from the Blackfoot passes and vicinity, and, running more towards the east for about twenty-five miles, empties into the Missouri above the Gate of the Mountains, and eighteen miles southeast of the preceding stream. It forms part of the approach to these passes from the head of the Muscle Shell by the route explored by Lieutenant Mullan in September, 1853.

No large stream runs into the Missouri above this stream until the three great forks, called by Lewis and Clark Jefferson, Madison, and Gallatin, are reached, about sixty-eight miles to the southeast. These three rivers, of nearly equal size, form the sources of the Missouri flowing from the lofty mountains which almost encircle its headwaters towards the west, south, and east. Only the Jefferson Fork has, however, been traced to its sources, which were found by Lieutenant Mullan in the vicinity of Big Hole prairie and pass, where there is an excellent communication with the Bitter Root valley at its head near longitude 113° 50′, and another pass to Deer Lodge prairie, sixty-five miles further east. Captain Clark followed it down in a canoe through its very winding course for about eighty-five miles in a direct line to where it joins Madison Fork. The Muscle Shell is the principal river which enters the Missouri on the south side, joining it near longitude 108°. It rises in the Girdle mountains in latitude 46° 30′, longitude about 110°, and running eastward for about one hundred and sixty-five miles, turns a spur of the Judith range and takes a general northeast course for ninety miles to its mouth. When crossed by Lieutenant Mullan, at least one hundred miles above its mouth, it was forty or fifty yards in width and from two to four feet deep, with a very rapid current. This was in the dry season in September. Judith river is the next, emptying about eighty-four miles west of the Muscle Shell, and rising by numerous branches in the Girdle and Judith ranges between which it runs, having a course generally north for about sixty miles. From the frequency of its branching, it does not seem likely to be useful for the purposes of navigation. Arrow river, which empties nine miles west of it, also rises by three branches in the Highwood range, a spur of the Girdle mountains. Its sources are not more than thirty-five miles from the Missouri, and it can only be serviceable for rafting. The next streams on this side are above Fort Benton. Shonkin

a. Lewis & Clarks Pass *b. Heart Mountain*

Sarony, Major & Knapp, Lith.s 449 Broadway N.Y.

ROCKY MOUNTAINS, LOOKING WESTWARD.

creek is a small prairie stream, rising near the Highwood range, and running northwest empties nearly opposite the fort. Highwood creek has the same origin and general course, but is a larger stream, emptying twenty miles southwest of the fort. It is the stream by which the Fur Company obtain their lumber from the mountains. Belt Mountain creek empties six miles higher up, and has the same general course, but is a larger stream, and probably rises much further up, or perhaps within the basins lying beyond the Girdle mountains. At its mouth Mr. Tinkham found some difficulty in selecting a place shallow enough for his mules to ford in November. Its navigation, if any, is, however, cut off from that of the Missouri by rapids below its mouth. Smith's river, still further above the Falls, is said by Lewis and Clark to be eighty yards wide at its mouth, and as flowing through a charming valley from the southeast, visible for twenty-five miles before it was hidden by mountain spurs. It is supposed to be the same stream struck near its source by Lieutenant Mullan in going west from the Muscle Shell, about eighty miles southeast of the Missouri, where it had beautiful green meadows in its valley, which is there from a mile to a mile and a half wide, the stream fifty feet in width, and having many tributary branches and valleys. He travelled down its course for a day, finding it to improve as he descended it.

The Blackfeet have often desired to have farming locations. Through this region are many landmarks which will attract the especial attention of the voyageur. South of the Missouri, the Highwood, Girdle, and Judith mountains furnish an inexhaustible quantity of mountain pine, and make the southern limit of the plateau. Besides these, there are prominent buttes near the line of travel, often of striking and fantastic forms, such as the Boque d'Otard, Knee, and Trunk, between the Marias and Teton ; the Oksut, south of the Teton ; the Big Knees, Crown Butte, and Bird Tail rock, near Sun river ; and Heart mountain, (of which a sketch is given,) near the sources of Elk Fork. There is much excellent land and abundant groves of cottonwood on these many streams. The plateau itself is arable in many portions, though not often continuously so. There is no reason why Indian corn should not attain great perfection throughout the whole country from Fort Union to near the divide of the mountains, that is, to Medicine river. There is nothing to prevent a good crop of any of the cereals. Vegetables of all kinds will thrive here. This is an extraordinarily fine grazing country. The quantity of buffalo who find their sustenance over this plateau, and thence down to Fort Union, is almost inconceivable. The winter homes of the Blackfeet, some six to seven thousand in number, are on the Teton, the Marias, and Milk rivers. They are the owners of great numbers of horses, and they find sustenance for their animals and food from the buffalo through the winter. It has been the habit of the fur companies to have winter posts on Milk river at the point known as Hammell's Houses, and also at the forks of the Marias river. So we have all the results of their twenty-five years' observation for the estimate of the number of Indians and the mode of their sustenance, as well as how their animals thrive. The country in the vicinity of the Girdle, Belt, and Highwood mountains, and thence southward along the upper waters of the Missouri and of the Muscle Shell, to the three forks of the Missouri and the extreme upper waters of the Yellowstone, abounds in wood, is well grassed, and furnishes arable land. About the forks of the Missouri there are rich, extensive, and beautiful prairies, which are described by Lewis and Clark as follows, they having reached this point on their upward voyage on July 27, 1804:

Here the country suddenly opens into extensive and beautiful meadows and plains, surrounded on every side with distant and lofty mountains. On the right side of the Missouri a high, wide,

and extensive plain succeeds to this low meadow, which reaches the hills. In the meadow a large spring rises about a quarter of a mile from this southeast fork, into which it discharges itself on the right side. Between the southeast and middle forks a distant range of snow-topped mountains spread from east to south above the irregular broken hills nearer to this spot. On the middle fork the low grounds are several miles in width, forming a smooth, beautiful green meadow. Between these two forks, and near their junction with that from the southwest, is a position admirably well calculated for a fort. An extensive plain lies between the middle and southwest forks which is more serpentine in its course than the other two, and possesses more timber in its meadows. This timber consists almost exclusively of the narrow-leaved cotton-wood, with an intermixture of box-elder and sweet willow. Nearly all around us are broken ridges of country like that below, through which these united streams appear to have forced their passage. On Captain Clark's route from the forks of the Missouri, in 1806, to the Yellow-stone, across a spur of the Belt mountains, he found the distance forty-eight miles, the greater part of which is through a level plain; indeed, from the eastern branch of Gallatin river, which is navigable for small canoes, the distance is not more than eighteen miles, with an excellent road over a high, dry country, with hills of considerable height and no difficulty in passing.

CHAPTER XIV.

THE MOUNTAINS WEST OF FORT BENTON.—THE ROCKY MOUNTAINS.—BITTER ROOT RIVER.—CLARK'S FORK.—THE PASSES.—THE COLUMBIA RIVER, ITS TRIBUTARIES AND VALLEY.—CASCADE MOUNTAINS.—THE RIVERS AND ISLANDS OF THE SOUND.

The Mountains West of Fort Benton.—The Black Hills.—The rise between Fort Benton and Fort Union.—Observation on the climate and soil.—The Rocky Mountains.—Lewis and Clark's description.—The Soil.—Meteorological Observations.—The Kamas Prairies on the Kooskooskia.—The Western Backbone.—The Eastern Backbone.—The country between them.—The Water Lines.—The Bitter Root River near Big Hole Prairie.—Junction of the Hell-Gate and the Blackfoot.—Hell-Gate River and the Little Blackfoot Valley.—Deer Lodge Prairie and the Boiling Springs.—Tributaries of the Bitter Root below Hell-Gate.—Flint Creek Valley.—Clark's Fork.—Flathead Lake.—Tributaries above and below the Lake.—Navigation of the River.—Soil of the Valley.—The Koutenay.—The Passes between the Missouri and the Columbia: Big Hole Pass.—Ross's Hole.—Hell-Gate Pass.—The Southern and Northern Little Blackfoot.—Cadotte's Pass.—Lewis and Clark's Pass.—The Marias Pass.—The Passes to the Great Plain of the Columbia: The Southern and Northern Nez Percés Trails.—Cœur d'Alène or Stevens's Pass.—Area of arable and timbered land.—The Great Plain of the Columbia.—The course of the Columbia.—Its Navigability.—Obstructions.—Tributaries on the Eastern Shore, Snake, Spokane, Kooskooskia, Salmon, Walla-Walla Rivers and their valleys.—The Cœur d'Alène.—Character of the Country.—Minerals at the Koutenay.—The Blue Mountains and the Tributaries of the Walla-Walla.—Lakes Pend d'Oreilles and Rootham.—Tributaries on the Western Shore of the Columbia: The Yakima.—The Pisquouse.—False reports concerning this region.—Agriculture of the Yakima District.—Tributaries of the Columbia from the South: The Umatilla.—Willow Creek.—Butter Creek.—John Day's River.—Des Chutes River.—Cascade Mountains.—Their distance from the Coast.—The Peninsula between Puget Sound and the Coast.—Shoalwater Bay.—Gray's Harbor.—Chehalis River.—Willopah River.—The Qui-nauitl.—The Cowlitz.—The Des Chutes.—The Nisqually.—The Snohomish and the Snoqualmoo Falls.—The Stolu-kwha-mish.—The Dwamish.—The Nachess.—Trails at Lake Kitchelus.—The Nachess and Snoqualmoo Passes.—The Skagit.—Character of other Rivers.—The Northern Boundary Line.—Quality of the land.

ROCKY AND BITTER ROOT MOUNTAIN REGION.

My attention was early given to the character of the country between Fort Benton and the emigrant route by Fort Laramie and the South Pass, and I became satisfied that it was entirely practicable, easy for wagon or pack roads, much of it wooded, and generally arable and grassed. It was reported by Indians and voyageurs to be well watered. This conclusion of mine in 1853, and the judgment which I then formed that the country ought to be examined in order to establish the connexion between our northern passes and the great emigrant trail by the South Pass, thus far seems to have been verified so far as the explorations have progressed. Lieutenant Warren has examined the country for some 175 miles north of Fort Laramie, and thence to the eastward, and has found a country similar to the wooded country, soon to be described, on the northern route, having large quantities of fine pine and much arable and grazing land. It is to be hoped that this efficient and enterprising officer will be intrusted with a thorough examination of the country and the establishment of the connexion. The Black Hills, which have been a great bugbear to geographers and to voyageurs not acquainted with them, are inconsiderable, and portions of the country which have been laid down even on the maps of climatologists as barren and sterile are pronounced by geologists who pass over them as being arable.

Fort Benton is 2,780 feet above the sea, and Fort Union 2,019 feet. Thus the general rise of the country between these two points, a distance along the 48th parallel of latitude of 306 miles, is 761 feet, and the rise from Fort Benton to what may be deemed the western edge of the plateau is 1,630 feet on a distance of eighty-one miles. It is somewhat difficult to form

a general estimate as to the quantity of arable land in this region. Nothing but the detailed surveys of the land office can furnish minute data; but the eye of the experienced observer going over a country can discern whether it is adapted to agriculture or to grazing, or to a union of the two; whether it can be occupied in the small farms previously alluded to, or simply by ranches, having about them flocks and herds. This whole country would be a fine country for stock, for horses, and especially for sheep. In a meteorological paper which follows, the climate, constituents of the soil, and the snows of winter will be presented; but we will now pass on to the consideration of the Rocky mountain region. This region stretches from the 111th meridian to the 117th meridian on the 47th parallel, and both north and south has a generally northeast and southwest direction. I have already referred to the good arable country on its eastern slope.

On the western slope the following description from Lewis and Clark will show the delightful and promising character of the country. When encamped in the Kooskooskia valley on May 17, 1805, they say: "The country along the Rocky mountains, for several hundred miles in length and about fifty wide, is a high level plain, in all its parts extremely fertile, and in many places covered with a growth of tall, long-leaved pine. This plain is chiefly interrupted near the streams of water, where the hills are steep and lofty, but the soil is good, being unencumbered by much stone, and possesses more timber than the level country. Under shelter of these hills the bottom lands skirt the margin of the rivers, and though narrow and confined are still fertile and rarely inundated. Nearly the whole of this wide-spread tract is covered with a profusion of grass and plants, which are at this time as high as the knees. Among these are a variety of esculent roots, acquired without much difficulty, and yielding not only a nutritious, but a very agreeable food. The air is pure and dry, the climate quite as mild, if not milder, than the same parallel of latitude in the Atlantic States, and must be equally healthy; for all the disorders which we have witnessed may fairly be imputed more to the nature of the diet than to any intemperance of climate. This general observation is, of course, to be qualified, since in the same tract of country the degrees of the combination of heat and cold obey the influence of situation. Thus the rains of the low grounds near our camp are snows in the high plains, and while the sun shines with intense heat in the confined bottoms, the plains enjoy a much colder air, and the vegetation is retarded at least fifteen days; while at the foot of the mountains the snows are still many feet in depth, so that within twenty miles of our camp we observe the rigors of the winter cold, the cool air of spring, and the oppressive heat of midsummer. Even on the plains, however, when the snow has fallen, it seems to do but little injury to the grass and other plants, which, though apparently tender and susceptible, are still blooming at the height of nearly eighteen inches through the snow. In short, this district affords many advantages to settlers, and if properly cultivated would yield every object necessary for the subsistence and comfort of civilized man." Proceeding eastward they reached one of the Kamas prairies on the Kooskooskia, within the spurs of the Bitter Root mountains. There they encamped in a point of woods bordering the extensive level and beautiful prairie, and as the kamas was in blossom, it being the 10th of June, the surface presented a perfect resemblance to a lake of clear blue water. The country, though hilly around them, was generally free from stone, extremely fertile, and well supplied with timber, consisting of several species of fir, pine, and birch. Thus we have now to describe a mountain region whose western slope is described by Lewis and Clark as extremely fertile, and which is known by the late explorations to be extremely fertile, and is bordered on the east by an exceedingly

well-watered and most arable region, whose southern portion has also been described by Lewis and Clark as fertile and beautiful.

It will thus be seen that the mountain system lying between the plains of the Missouri and the great plain of the Columbia is denominated by Lewis and Clark as the Rocky mountains, but which, in my narrative, has been spoken of as the Rocky mountains and as the Bitter Root and Cœur d'Aléne mountains. Indeed, this mountain system consists of two backbones. The Rocky mountain chain, passing north from the sources of Snake river, branches off in about latitude 45° 30′ and longitude 113° 45′. One branch moves to the east and northeast, about ninety miles on the parallel. The other branch moves to the west and northwest about forty-five miles, also on the parallel. The two branches then continue in about the same general direction, north 40° west, and at a distance apart of about one hundred and thirty-five miles on the parallel. The western backbone, or the Bitter Root and Cœur d'Aléne mountains, decline somewhat in their northern course, so that on reaching Clark's Fork the chain becomes much broken and the system confused. It may be said to cross Clark's Fork at about the Cabinet mountain, and then it changes its course more to the west, forming the divide between Clark's Fork and the Koutenay river. The main range of the Rocky mountains, which, between the source of Snake river and the three forks of the Missouri, has a high altitude, and continues to be elevated along the region whence the Jefferson Fork has its source, begins to fall soon after it branches to the east. The divide has a singular course from this point: it makes a great bend to the east and a return again to the west, making nearly a semicircle, from which flow streams to the Clark's Fork of the Columbia. The semicircle commences at the Big Hole prairie, where you pass from the Bitter Root river to the upper tributaries of Wisdom river, and may be said to end at the Gates of Sun river. Its radius is eighty miles, and its periphery one hundred miles, the centre being near the junction of the Hell-Gate and Bitter Root rivers. Through this entire distance the whole chain is broken down, affording great numbers of passes, all of them having an altitude not far from 6,000 feet above the sea. Going north from the Gate of Sun river the mountains rise in elevation, so that when we come to our parallel the height of the passes exceeds 7,000 feet above the sea; and when we go further north to the 52d or 53d parallel of latitude, the divide exceeds 10,000 feet above the sea. It is the country, therefore, between these two great backbones of the Rocky mountains which I wish now to describe, and especially will I first call attention to that beautiful region whose streams, flowing from the great semicircle of the Rocky mountains before referred to, pass through a delightful grazing and arable country, and find their confluence in the Bitter Root river opposite Hell-Gate.

From the Big Hole prairie, on the south, flows the Bitter Root river, which has also a branch from the southwest, up which is a trail much used by Indians and voyageurs passing to the Nez Percés country and Walla-Walla. This trail was used in the exploration by Lieutenant Macfeely and Mr. Tinkham, and has since been used very much by my expressmen and trains. The Bitter Root valley, above Hell-Gate river, is about eighty miles long and from three to ten in width, having a direction north and south from the sources of the Bitter Root river to its junction with the Hell-Gate. Besides the outlet above mentioned towards the Kooskooskia, which is the most difficult, it has an excellent natural wagon road communication at its head, by the Big Hole Pass to Jefferson Fork, Fort Hall, and other points southward, as well as by the Hell-Gate routes to the eastward. From its lower end, at the junction of the Hell-Gate, it is believed that the Bitter Root river is, or can be made, navigable for small steamers for long

distances, at least, thus affording an easy outlet to its products in the natural direction. Hell-Gate (see sketch) is the debouche of all the considerable streams which flow into the Bitter Root, eighty-five miles below its source at the Big Hole divide. The distance from Hell-Gate to its junction with the Bitter Root is fifteen miles. It must not be understood from the term Hell-Gate that here is a narrow passage with perpendicular bluffs; on the contrary, it is a wide, open, and easy pass, in no case being less than half a mile wide, and the banks not subject to overflow at all. At Hell-Gate is the junction of two streams; the one being the Hell-Gate river and the other the Big Blackfoot river. The Hell-Gate itself drains the semicircle of the Rocky mountains from parallel 55° 45′ to parallel 46° 30′, a distance on the divide of eighty miles. The main stream of the Hell-Gate has its source in the Rocky mountains in parallel 46° 30′, longitude 112° 30′, and pursuing nearly a northerly course for sixty-five miles then receives the waters of the Little Blackfoot river, and continuing in the general direction north 50° west for forty-eight miles, receives the waters of the Big Blackfoot. The upper waters of this river connect with the Wisdom river, over a low and easy divide, across which Lieutenant Mullan with his party moved on December 31, 1853. Moving down this valley fifteen miles, we come to a most beautiful prairie known as the Deer Lodge, a great resort for game, and a favorite resting place for Indians—mild through the winter, and affording inexhaustible grass the year round. There is a remarkable curiosity in this valley—the Boiling Springs, which have been described by Lieutenant Mullan. This Deer Lodge prairie is watered by many streams, those coming from the east, having their sources also in the Rocky Mountains divide, and those coming from the west in the low, rolling, and open country intervening between the Hell-Gate and Bitter Root rivers. The Little Blackfoot, which has been referred to, is one of the most important streams in the line of communication through this whole mountain region. It has an open, well-grassed, and arable valley, with sweet cottonwood on the streams, and pine generally on the slopes of the hills; but the forests are quite open, and both on its northern and southern slopes there is much prairie country. The divides between the Little Blackfoot and Big Blackfoot, as well as between it and the tributaries to the south, are low, grassed, and much of them arable. The Little Blackfoot river furnishes two outlets to the country to the east. It was the southern one of these passes, connecting with the southern tributary of the Prickly Pear creek, that Mr. Tinkham passed over in 1853, and determined a profile of the route. It was also passed over by Lieutenant Mullan on his trip from the Muscle Shell, in 1853; but the northern pass was first discovered by Lieutenant Mullan when he passed over it with a wagon from Fort Benton, in March, 1854. There is another tributary of the Little Blackfoot flowing into it twenty-five miles below the point where Lieutenant Mullan struck it with his wagon, which may furnish a good pass to the plains of the Missouri. Its advantages and character were described to him by the Indians. Passing down the Hell-Gate river from the mouth of the Little Blackfoot, we come to several tributaries flowing from the south. Flint creek, one of them, is a large stream, up the valley of which there is a short route to the Bitter Root valley, in a direction west-southwest from its junction with the Hell-Gate. This route is described by Major John Owen, Indian agent, and Mr. Adams, late Indian agent, as more rough than that down the Hell-Gate, but can be travelled in from six to twelve hours less time.

A sketch is here given of the crossing of Hell-Gate river, January 6, 1854.

On these rivers are prairies as large as the Deer Lodge prairie, and the whole country between the Deer Lodge prairie due west to the Bitter Root valley consists much more of prairie than

CROSSING THE HELLGATE RIVER JAN 6TH 1854

Stanley Del.

HELL GATE.—ENTRANCE TO CADOTTE'S PASS FROM THE WEST.

of forest land. The Hell-Gate river is thus seen to be 130 miles long, flowing for 60 miles through the broad and fertile Deer Lodge prairie, which is estimated to contain 800 square miles of arable land. Then, taking a direction more transverse to the mountain, opens its valley, continues from two to five miles wide, until its junction with the Big Blackfoot, at Hell-Gate, after which it widens out to unite with the valley of the Bitter Root. On this part of it there are at least 150 square miles of fine arable land in the valley, and much grazing prairie on the adjoining hills. Around the Little Blackfoot most of the country is a hilly prairie, suitable for grazing, while in the immediate valley is sufficient arable land for the subsistence of a grazing population. The Big Blackfoot drains the semicircle from the Hell-Gate to somewhat north of the Gate of Sun river; the main stream flowing from the mountains at Cadotte's and Lewis and Clark's Pass in latitude 47° 12′ and longitude 112° 20′. In the narrative a very minute description has been given of this valley and of its tributary streams; and it will be sufficient in this memoir to state that it furnishes undoubtedly at least four passes to the Missouri, two of which have been carefully examined in the course of the explorations. There is, properly speaking, on this river, as on the Hell-Gate river, no cañon; but the term cañon, which has been used, has reference to points where the wide and extensive prairies bordering the river narrow to a comparatively limited space, and is also used to describe passes where there are no special difficulties, and where there is in all cases room enough for any kind of construction, looking to the movement of men and goods. The river itself has a general course a little south of west, winding considerably in some parts, but the length of its valley is about seventy-five miles, varying from half a mile to twelve miles in width. Neither this nor the Hell-Gate can be considered navigable above their junction. Its greatest rise and fall is six feet, as determined by careful observation of its water marks. On the 18th July, 1855, its water level was from 8 to 12 inches above low-water mark and 5 feet below high-water mark. These streams, together with the Bitter Root river, constitute a system of waters flowing from the semicircle, and after their junction, opposite Hell-Gate flow in a general course north 45° west to their junction with Clark's Fork at the Horse Plain, latitude 47° 21′, longitude 114° 38′. I have not deemed it necessary to speak especially of the western tributaries of the Bitter Root in this general connexion, as perhaps they have been sufficiently described in the particular description of the Bitter Root valley. Clark's Fork above its junction with this system of waters at Horse Plain assumes another name, and is known as the Flathead river. Indeed, Clark's Fork may be considered to be formed by the junction of the two systems of waters, the Bitter Root from the south and the Flathead from the north, which, in its turn, drains nearly as large an extent and as fine a country as the Bitter Root itself. These two systems of waters, the Flathead and the Bitter Root, are separated by a low mountain spur, which runs from about Stevens's prairie, on the Big Blackfoot, to their junction, opposite Horse Plain. This spur is low, generally well timbered, well watered, and a large portion of the land arable.

Passing from the Hell-Gate to the Flathead river, we cross over this spur by a low divide, going through the Coriacan defile, and coming upon the waters of Jocko river.

The height of this divide above the Hell-Gate is 560 feet, and above the Flathead river, at the mouth of the Jocko, is 650 feet. From this divide a view of surpassing beauty, looking northward, is presented to the beholder. He sees before him an extraordinarily well-grassed, well-watered, and inviting country. On the east are the divides, clothed with pine, separating the Jocko and its tributaries from the streams running into the Big Blackfoot and into Flathead lake; and along the line of which two rivers Mr. Tinkham moved in September, 1853.

To the north the Flathead lake, twenty-five miles long and six miles wide, is spread open before you, with extensive prairies beyond; and on the west, sloping back from the banks of the Flathead river, a mingled prairie and forest country is seen. Here in a compact body, is one of the most promising countries in this whole region, having at least two thousand square miles of arable land. Flathead river above the lake is formed by the waters of three streams, the northeast flowing from the pass pursued by Mr. Tinkham in October, 1853, and which, in the reports, has been named the Marias Pass. Its northwest branch, Maple river, has its rise in longitude 114° 50′ and in latitude 48° 40′, and connects by a low divide and through a timbered country with the Koutenay river, furnishing a route which was pursued by Lieutenant Mullan in his trip to the latter stream in April, 1854. The eastern branch, Swan river, joins it only three miles above the lake, and probably furnishes a route to the two Marias Passes, partially explored by Mr. Doty in 1854. Below the lake the Flathead river flows, following its windings some fifty miles to it junction with the Bitter Root, where the united streams assume the name of Clark's Fork. In this distance it is 100 to 200 yards wide, and so deep as to be fordable with difficulty at low water, its depth being three feet at the shallowest places. Its current is rapid, and there is a fall of fifteen feet five miles below the lake. About eighteen miles below the lake it receives a considerable stream from the northwest, called Hot Spring creek, which was followed down by Lieutenant Mullan, on his return from the Koutenay, in May 1854, for thirty miles. In its valley, and around it, is also a large extent of fine land. Nearly opposite a small stream runs in from the east, and another from the same side ten miles below, by which there are routes to the upper part of Big Blackfoot valley. Three miles below the last it receives Jocko Fork from the south, and then turns abruptly in its course from south to northwest, receiving in the remaining nineteen miles to the Bitter Boot only small streams, of which Kamas Prairie creek, from the north, is the principal. None of the branches of Clark's Fork above the junction can be considered navigable, but the river itself, (Flathead,) with the exception of the rapids and falls below the lake, which may be passed by a short canal, gives a navigation of at least seventy-five miles to the head of Flathead lake.

Clark's Fork empties into the Columbia about four-tenths of a mile north of the 49th parallel, as determined by a single observation made in 1853, but it cannot, however, be considered as accurately fixed. At its mouth is a fall of fifteen feet in height and a hundred and fifty yards in width. At a distance of a quarter of a mile from the main stream it passes through a deep gorge in the range, where it has a further fall of three feet. From this point to the Mission of St. Ignatius (seventy miles by the river) it has never been explored. About one hundred and thirty miles above its mouth is the Pend d'Oreille or Kalispelum lake, which is a beautiful sheet of water about forty-five miles in length, formed by a dilation of the river. The river is sluggish and wide for some twenty-six miles below the lake, where rapids occur during low water. Steamboats could ascend from this point to a point nine miles above the lake, or eighty miles in all. At high water they could ascend much further. Between the Cabinet (twenty-five miles above the lake) and a point seventy-five miles below the lake (a total distance of one hundred and forty miles) the only obstacle which occurs is where the river is divided by rocky islands, with a fall of six and a half feet on each side. The Hudson Bay Company's large freight boats are in the habit of ascending from the lower end of Pend d'Oreille lake to the Horse Plains, a distance of about one hundred and thirty-five miles, making only two portages. Above the Cabinet the river would be excellent for rafting purposes. Its greatest rise and fall is fifteen feet. The valley of Clark's Fork is generally wide, arable, and inviting settlement, though

much of it is wooded. The prairies occupy but an inconsiderable portion of its valley and the surrounding country, yet there is no deficiency of grass, even for large trains, on this route, where care is taken in selecting camps. On the contrary, on this river are several very celebrated wintering places for Indian horses. Horse Plains derives its name from this circumstance. Thompson's prairie and the country about the Pend d'Oreille lake are other instances. The Koutenay river enters into our territory for a short distance, preserves a general parallelism to Clark's Fork, and flows into the Columbia some twenty miles north of the boundary. From its headwaters are at least two passes over the Rocky mountains, but there has been no exploration of the river, and it is not probably navigable for any considerable distance.

Having now described somewhat the rivers and the adjacent country of this mountain region, I will proceed to describe the passes which take you to the plains of the Missouri and to the plains of the Columbia. Big Hole Pass, as approached from the north, or Bitter Root valley, has an excellent road for fifteen miles above the forks, where it becomes somewhat difficult for wagons for two or three miles across the spur called Ross Hole mountain. Above this is another broad, open prairie called Ross's Hole. This mountain can, however, easily be avoided by cutting away the trees which occupy the valley around its base. From Ross's Hole Lieutenant Mullan thinks that wagons can ascend, without much difficulty, the dividing ridge called Big Hole mountain to the waters of Wisdom river, to which the descent is perfectly easy, without any obstruction. The pass called Hell-Gate, sixty-five miles further east, crossed over by him on December 31, 1853, in returning north from Fort Hall, was found to offer no obstacle whatever to wagons, the ascent and descent being both easy and gradual. It leads into the large and beautiful Deer Lodge prairie, on Hell-Gate river. From Wisdom river, at their passes, down to its junction with the Jefferson Fork, is an excellent prairie route, which is believed, from Lewis and Clark's account, to extend down to the forks of the Missouri.

The Southern Little Blackfoot was traversed by Mr. Tinkham in November, 1853, and by Lieutenant Mullan in March, 1854, when going from the Bitter Root valley to Fort Benton. It is considered by Lieutenant Mullan practicable for a wagon road, but less advantageous than the northern. Its elevation, as ascertained by Mr. Tinkham with the barometer, is 6,283 feet. The dividing ridge is but from 300 to 500 feet high, and the eastern approach is practicable for a railroad with a grade of 50 to 60 feet per mile, the ridge being passed with a two-mile tunnel, and the western descent with a grade of 30 feet. The broken character of the country between it and Fort Benton makes it, however, less fit for a main route than the passes further north, though it may be suitable for a direct route in the direction of Council Bluffs. It passes from Big Prickly Pear creek on the east to the south branch of the Little Blackfoot on the west. Its distance from the Hell-Gate Pass is about fifty miles, in a northeast direction. The Northern Little Blackfoot Pass, six miles to the north of this, is the one crossed by Lieutenant Mullan with a wagon in March, 1854. It is described by him as perfectly easy, the descent being so gradual on the west side that his wagon was driven down with the mules trotting. The descent of the Little Blackfoot and Hell-Gate river is $22\frac{1}{2}$ feet per mile, and with a little cutting this can be made a better wagon route than any other. Cadotte's Pass, forty miles northeast of the last described, connects a tributary of Dearborn river on the east with a branch of the Big Blackfoot on the west. The approach from the east is up the narrow valley, bordered on each side by high wooded hills. The summit is a narrow, sharp ridge, about a mile and a half wide from base to base, and partially covered with small trees. The western base is about 500 feet higher than the eastern, and the descent is very rapid, favoring the construction of a tunnel.

Lewis and Clark's Pass is but a few miles north of Cadotte's, and connects the more northern branches of Dearborn and Big Blackfoot rivers. Its elevation is 6,519.3 feet, and it also has a narrow ridge, only two miles and a quarter from base to base. The most northern pass, supposed by Mr. Tinkham to be the Marias, connects one of the principal sources of Marias river with a branch of Flathead river on the west. The approaches on each side are through deep mountain ravines, and a wall-like divide over 7,600 feet high separates the streams of opposite sides. A tunnel might be made at about the elevation of 5,450 feet, but as the branch of the Flathead falls 2,170 feet in seventeen miles, this route is not likely to be used. The pass last described is not, however, the true Marias Pass, for after leaving it and coming upon the chief tributary of the Marias, and moving southward eight miles, the true Marias Pass is plainly discernible. The true Marias Pass connects with the Badger tributary of the Marias, is wide, open, and easy, so far as it was examined by Mr. Doty in 1854, and as described by the Little Dog, the particulars of which are given in the narrative. It is probable that another pass, intermediate between the Northern Little Blackfoot and Cadotte's Pass, will be found entirely practicable, and it should be examined. The passes which lead to the great plain of the Columbia are the southern Nez Percés trail, to which reference has already been made, leading from the upper waters of the Bitter Root; the northern Nez Percés trail, the route pursued by Lewis and Clark in their great explorations, and which was followed by Lieutenant Mullan on his return trip in 1854; the Cœur d'Aléne or Stevens's Pass, pursued by me in 1853; and Clark's Fork, pursued by Lieutenant Saxton and the main train in 1853. The following is a brief description of these passes: The southern Nez Percés trail goes up the southwest fork of the Bitter Root river, and crossing a dividing ridge, winds about over the summits of the high and rugged mountains separating the Kooskooskia from a more southern branch of Snake river, taking a very circuitous course to the junction of the main forks of the Kooskooskia. At the point where Mr. Tinkham's observations with the barometer ended, it had reached a summit over 7,600 feet above the sea, probably the same point where Lieutenant Macfeely found snow early in September. This is a mere Indian trail, which avoids the densely wooded valleys, and goes over the mountain summits, where the elevation prevents the growth of trees, and substitutes a growth of grass. Should it be found practicable to cut a road down the valley of the Kooskooskia, the divide between it and the Bitter Root is here still nearly 7,000 feet in altitude, making more northern lines preferable. The distance over mountains by this route was estimated by Mr. Tinkham to be one hundred and thirty-eight and a half miles. The northern Nez Percés trail is in character much the same, but its course is more direct. It passes up the valley of the Lou-Lou branch of the Bitter Root, (Traveller's Rest creek of Lewis and Clark,) and, crossing to a northern branch of the Kooskooskia, winds along the heads of branches flowing into this and the Peluse (?) in a southerly direction, till it comes out on the Great Plain on the same place as the southern trail. The distance travelled across mountains by this route is about one hundred and twenty miles. The mountain dividing the waters which flow east and west is lower than some of those crossed in going up Lou-Lou creek, but covered with pine and fallen timber. This may be found a tolerable wagon route from valley to valley, if the timber which now obstructs them shall be found the only obstacle.

The Cœur d'Aléne or Stevens's Pass, leading from St. Regis de Borgia creek, (which empties into the Bitter Root river about half way between the Jocko cut-off and Horse Plain,) takes a west-northwest direction up that stream, and crossing a divide only 5,089.7 feet above the sea, continues in the same course down the Cœur d'Aléne river to the lake at the border of the Great

Plain. In this pass the western ascent is the most rapid. The western base of the dividing ridge is of the same height as the eastern. The ridge will require a tunnel only $1\frac{3}{4}$ mile through. For a wagon road this is decidedly the best and most direct route, being almost in a line with Hell-Gate valley, and requiring but a moderate amount of work to make it practicable, chiefly the cutting out of timber in the valley. The route down Clark's Fork crosses by the Jocko cut-off from Hell-Gate to the Flathead river, and crossing this, follows down its north bank in a northwest direction for $165\frac{1}{4}$ miles to the south end of Flathead lake. The only mountain ridge which could not be removed in making a railroad by this route is that between Hell-Gate and the Jocko, which is a rise of 560 feet, requiring a grade of fifty feet in ascending and sixty in descending to the north. This would probably be preferable to following down the Bitter Root to its junction with the Flathead, as that is reported by Mr. Lander to require many crossings, rock cutting, and embankments, below the mouth of the St. Regis de Borgia.

Lieutenant Donelson estimates that ten men, in seventy-eight days' work of ten hours, would make this a good wagon road from Hell-Gate to the mouth of Pend d'Oreille lake. An examination of Lewis and Clark's narrative shows this curious incident: The Indians impressed them with the idea that the route which they pursued was altogether the most practicable of any route across these mountains, and yet it is unquestionably the worst route of the whole. They adopted the same policy in reference to these passes which they afterwards did in the Yakima country with the parties of the exploration. Indeed, so tenacious not only are the Indians, but even the missionaries, of their right of occupation, that it is impossible for them to resist the inclination to underrate the country and the routes, in order to keep white people out of it. Now, this route of Lewis and Clark is frequently taken by Indians at the present day, not because it is a good route, but because salmon and roots are found higher up the stream than on any other route, and it is a route, therefore, which furnishes them their food. They get high up the Koos-koos-kia on this route large stores of salmon, indispensable to their subsistence on their way to the plains of the Missouri. There are unquestionably other passes across the Bitter Root mountains which future exploration will develop. Reference in the narrative is made to a probable pass from the Peluse, which has its rise in the main chain of the Bitter Root mountains to a few miles from the Bitter Root valley, and has a nearly straight course to the westward, through a wide, open, and heavily-wooded valley from fifteen to twenty miles wide. This pass may connect with the Lou-Lou Fork. The St. Joseph's tributary of the Cœur d'Aléne river unquestionably furnishes another pass; and there are passes and known routes from points on Clark's Fork, just below Horse Plain, where you can pass into the Cœur d'Aléne country. From the divide of the Rocky mountains to the divide of the Bitter Root mountains there is an intermediate region, over one-third of which is a cultivable area; and a large portion of it is a prairie country, instead of a wooded or mountain country. The following estimate gives in detail the areas of arable land, so far as existing information enables it to be computed: In the region watered by the Bitter Root river and its tributaries, not including Hell-Gate, the prairie region may be estimated at 3,000 square miles; in that watered by the Hell-Gate and its tributaries, including the whole country south and west to the Bitter Root, but not including the Big Blackfoot, there is a prairie region of 2,500 square miles; in that watered by the Big Blackfoot and its tributaries, the prairie region is 1,300 square miles. The country watered by the Flathead river, down to its junction with the Bitter Root, and thence down Clark's Fork to the Cabinet, has a prairie region of 2,500 miles. The country watered by the Koutenay has 2,000 square miles of prairie. Thus we have, in round

numbers, 11,200 square miles of prairie land. The whole area of the mountain region (from divide of Rocky mountains to divide of Bitter Root, and from 45° 30′ to 49°) is about 30,000 square miles, and it will be a small estimate to put the arable land of the prairie and the forest at 12,000 square miles. Thus the country in the forks of the Flathead and the Bitter Root, stretching away east above the Blackfoot cañon, is mostly a table-land, well watered, and arable; and on all these tributaries—the Bitter Root, the Hell-Gate, the Big Blackfoot, the Jocko, the Maple river, the Hot Spring river, and the Lou-Lou Fork itself—the timber land will be found unquestionably better than the prairie land. It will not be in the immediate bottom or valley of the river where farmers will find their best locations, but on the smaller tributaries some few miles above their junction with the main streams. The traveller passing up these rivers, and seeing a little tributary breaking out in the valley, will, in going up it invariably come into an open and beautiful country. The observer who has passed through this country often ; who has had with him intelligent men that have lived in it long ; who understands intercourse with the Indians, and knows how to verify information which they give to him, will be astonished at the conclusions which he will reach in regard to the agricultural advantages of this country ; and it will not be many years before the progress of settlements will establish its superority as an agricultural region.

BITTER ROOT MOUNTAINS TO CASCADE MOUNTAINS.

Between the Rocky mountains and the coast are the Cascade mountains, which, in the Territory of Washington, have nearly a north and south course. This range, in about parallel 47° 15′, is extremely narrow and low, but both northward and southward widens out, having a base on the Columbia river extending from Mount St. Helen's to Mount Adams, and on the forty-ninth parallel from Mount Baker to the sources of the western tributaries of the Okinakane. The region between the Cascade and the Bitter Root and Cœur d'Aléne mountains, just described, is remarkable for the great interior plain occupying nearly two-thirds of the country, and which has been denominated the Great Plain of the Columbia. This central portion of the Territory is watered by the main Columbia itself and its great southern branch, the Snake river. The Columbia, having its source in latitude 50°, pursues a northern course to latitude 52° 10′, when it receives the Canoe tributary, whose source is in latitude 53° 30′. It then turns immediately to the west and south, and continues on a course generally south until it comes below the boundary, then it flows through this great plain in a general direction nearly south; when arriving at Old Fort Walla-Walla it turns to the west and flows into the ocean in about latitude 46° 15′, longitude 124°. In its north and south course there are remarkable bends, one in about latitude 47° 55′, longitude 118° 10′; it turns nearly due west and it continues this course to the Okinakane, in longitude 120° 05′, a distance on the parallel of about eighty-five miles, but by the river at least one hundred and twenty miles. It then flows southwesterly for about fifty miles, and at the mouth of the Pisquouse, in latitude 47° 22′, again turns towards the southeast, which course it preserves as far as Walla-Walla, a distance by the river of one hundred and sixty-five miles, or one hundred and forty in a direct line. From the Columbia entrance up to the Cascades, a distance of one hundred and sixty-five miles, the river is without obstruction and can be navigated by large steamers. Sea-going steamers can ascend as far as Vancouver, one hundred and fifteen miles from its mouth. The Indians say that at the Cascades the river used to be perfectly free, but the gradual encroachments on its precipitous banks at length gave rise to a land slide, which, falling into the river, made a sort of natural dam, which is evidently the case from the appearance of the shore. There is a portage

Stanley, Del.

Sarony, Major & Knapp, Lith. 449 Broadway N.Y.

BITTER ROOT RIVER NEAR FORT OWEN

around the Cascades of one mile and a half. The next obstruction is at the Dalles, two hundred and five miles from its mouth. At this place the Columbia makes a bend like a horseshoe towards the south and runs through a basaltic trough, with walls about twenty feet in height and two hundred yards apart; the current is very rapid, but is not rough. For canoes, a portage of eight hundred paces avoids this obstruction; for steamers, canaling a considerable longer distance would be required. In the absence of careful surveys, I have not the means of stating the distance along which improvements must be made to furnish continuous navigation, or, in the absence of such improvements, the shortest land portage which would be required.

The portage now in use is from the Dalles to the mouth of the Des Chutes, a distance of eleven miles. But this distance can unquestionably be very much reduced. For the past two seasons the army supplies for the Walla-Walla post have been transported in sailing vessels from the mouth of the Des Chutes river to Old Fort Walla-Walla, and it is known that from that point to Priest's Rapids no obstructions exist. At Priest's Rapids canaling would probably be required, or a land portage of some three miles. The other obstructions are: Buckland's Rapids, sixty miles above Priest's Rapids; Ross' Rapids, near the mouth of the Methow river; and Kettle Falls Ross' Rapids would not be an obstruction to steamers, but both at Buckland's Rapids and at Kettle Falls locks and canals would probably be required, more especially at the Kettle Falls, where the Columbia pitches over a ledge of rocks, making a perpendicular fall of about fifteen feet. In order to make the Columbia river continuously navigable from its mouth to Kettle Falls, a distance of 735 miles, locks and canals will be required at the Cascades and the Dalles, and probably at Priest's Rapids, and at Buckland's Rapids, giving the following reaches of navigable waters:

	Miles.
Entrance to Cascades	165
Cascades to Dalles	40
Dalles to Priest's Rapids	179
Priest's Rapids to Buckland's Rapids	66
Buckland's Rapids to Kettle Falls	274

Above Kettle Falls there is a navigable reach of some fifty miles, to a fall in the Columbia, a little north of the 49th parallel. It will be well to state that at high water steamers could probably ascend the whole distance from the Dalles to Kettle Falls, say from the middle of May to the middle of July. Steamers have been running regularly on the two first-mentioned reaches for some years, and a steamer is now ready to run on the third reach, between the Dalles and Priest's Rapids. The business has increased quite rapidly; so much so, that for three years there have been from Portland and Vancouver two lines of steamers to the Dalles, and the rates of freights and passengers have become greatly reduced. The annual freshet of the Columbia is caused by the melting of the snow in the Alpine regions of the Rocky, Bitter Root, and Cascade mountains, and, as a consequence, takes place in the warm months of spring and early summer, commencing about the middle of April, and attaining its greatest height usually, and very regularly, by the 15th of June, at which time all the rapids from the Dalles to the Kettle Falls, near Colville, are, so to speak, submerged. Its great southern tributary, Snake river, has a general course in a semi-circle from its sources, in latitude 44°, longitude 112°; running first south, and in latitude 42° 30′, curving around to the west, northwest, and finally north, to

the mouth of the Koos-koos-kia, in latitude 46° 30′. It then turns westward and joins the Columbia in about latitude 46° 15′, longitude 118° 49′, about forty-eight miles below Priest's Rapids. It is probably navigable for steamers at certain stages of the water as far as the mouth of the Peluse, a distance of sixty miles, and probably to its junction with the Clearwater, or Koos-koos-kia.

Lewis and Clark took canoes on the Koos-koos-kia 59 miles above its mouth, and descended to the Snake, and thence to the Columbia, from the 7th to the 10th of October, 1805, the river being at its lowest stage. Their course on the Koos-koos-kia was 59 miles and on the Snake 139½ miles. Comparing the difficulties they met with on the Snake with those they encountered on the Columbia, from the mouth of the Snake to the Dalles, they seem to be all of the same general character, leaving but little doubt of the navigability of the Snake for steamers to the mouth of the Koos-koos-kia, or, perhaps, for even sixty miles further. The other streams which flow into the main Columbia from the east, worthy of being referred to in this connexion, are the Spokane, which has its confluence with the main Columbia at the point where it turns from the south to make the great bend to the west; Clark's Fork, and the Koutenay river, which have been already referred to in the description of the mountain region. The Snake river itself has considerable tributaries: first, the Peluse, which consists of several branches, one coming from the north, having its rise in the central portion of the Great Plain of the Columbia; but the main branch comes from the main divide of the Bitter Root mountains, flows nearly due west for 130 miles, and joins the other branch of the Peluse twelve miles above its mouth. In the narrative a circumstantial account is given of the great fall of the Peluse, which is an extraordinary place for salmon, and therefore a great resort for the Indians. The most considerable tributary of Snake river, however, is the Clearwater or Koos-koos-kia river, which flows into the Snake at a point where, running nearly due north, it turns suddenly to the west. This Koos-koos-kia has several branches which, with the main stream, flow through a country densely wooded with fir and larch, spruce and cedar. These tributaries of the Koos-koos-kia coming from the north are not navigable, but are excellent for rafting; and the pineries and forest trees on their banks will furnish an inexhaustible supply for settlements in the lower portion of the Clearwater and Snake river valleys, now destitute of wood. The Salmon river flows into the Snake fifty miles above the mouth of the Clearwater, and it also passes through a very rich and arable country. At the crossing of Salmon river, a landmark well known to Indians and voyageurs, the Mormons had last year a flourishing settlement. The Snake river forms a great re-entering from the Clearwater to its junction with the Columbia, which re-entering, being bounded on the south by the Blue mountains, has been named the Walla-Walla valley, although that term properly applies to the immediate system of valleys whose streams connect with the Walla-Walla river itself. That portion of the Great Plain lying east of the main Columbia, and which may be regarded as bounded on the north by the Spokane, and on the east by the foot-hills of the Bitter Root mountains, is, for the most part, well watered and well grassed. The eastern half of this portion is exceedingly well adapted to agricultural purposes. The various streams—the Peluse, the Kamas Prairie creek of the Cœur d'Aléne, the Spokane and Cœur d'Aléne rivers—are well timbered with pine, and numerous rivulets and springs are found through that portion of the country, facilitating the progress of settlements, and rendering the whole at once available to the agriculturist. Indeed, the whole of the western slopes of the Bitter Root mountains are densely timbered with pine, spruce, larch, cedar, and other trees. These spurs have, in most cases, a gradual slope to the west, and the

valleys of the several streams above referred to, as well as the Clearwater and Clark's Fork, are wide and open, including in the lower valley the immediate, gentle, and numerous lateral spurs branching off from the main spurs.

The central portion of the district under review is remarkable for its great number of lakes, which are favorite places of resort for wild fowl. On these lakes are seen swans, geese, and ducks in large numbers. The western portion of this country, however, commencing a little north of the mouth of Snake river, and terminating some distance south of the mouth of the Spokane, is rather sparsely grassed and scantily supplied with water for farming purposes. Looking on the map, it will be observed that the course of the river almost makes a peninsular of this poorest portion of the Great Plain east of the main Columbia itself. It is a basaltic formation; and it would seem that the walls of basalt occurring from point to point had dashed the river up against the immediate spurs of the Cascades, crowding it into a sinuous and somewhat difficult course. Here is the great coulée which, in the narrative, is referred to by Lieutenant Arnold, and which has been supposed to have been the former bed of the river. This coulée, which, starting from the Columbia sixty miles below the mouth of the Spokane, and moving in a general direction south-southwest, does not extend across the peninsular to the Columbia again, but after proceeding twenty-five miles, passes into the general surface of the plain and disappears. Yet in this portion of the Great Plain, and especially on the bank of the main Columbia, are many tracts and swales of good land. Indeed, there will be always found in this portion farming land enough to make practicable the occupation of the whole country by stock raisers and wool growers. The stock raiser will always be able to find land enough for the supplies he requires for his family. It is somewhat remarkable that leaving either the main Columbia below Fort Walla-Walla, or the Snake river, or the Clearwater, and passing over the high bluffs which border these rivers on the northern side, you at once enter upon a rich table-land. At the Red Wolf's ground these bluffs are more than one thousand feet above the immediate river valley, and in the neighborhood of the mouth of the Peluse eight hundred feet. Thence they decline somewhat gradually to the mouth of Snake river, where the country, for many miles about, is not over fifty feet above the waters of the Columbia; north of the Columbia the bluffs are also several hundred feet high. This country is exceedingly well known to the old residents of the interior, who travel it in various directions, there being many trails crossing the Snake river and leading to Colville and the Bitter Root valley. From Lapwai, the Red Wolf's ground, a point intermediate between the Red Wolf's ground and the mouth of the Tukanon and the mouth of the Peluse, trails pass on to the interior, all proceeding from a common point in the Walla-Walla valley. This country is better supplied with wood than has been generally imagined. If the voyageur travelling over this country, whatever route he takes, be asked what sort of country it is, he will tell you an excellent country for travelling—wood, water, and grass everywhere. But the pine of the Spokane extends nearly to its mouth, and for some miles south of the river. The Spokane is the name of the main stream to its junction with the Cœur d'Aléne river, when its name is given to a smaller tributary coming from the north, the Cœur d'Aléne being the main stream. One of the most beautiful features of the Cœur d'Aléne river and country is the Cœur d'Aléne lake, which is embosomed in the midst of gently sloping hills, covered with a dense forest growth; the irregularity of its form, and the changing aspect of the scenery about it, makes it one of the most picturesque objects in the interior. The Cœur d'Aléne river itself has tributaries flowing from near the main divide of

the Bitter Root, the most considerable of which is the St. Joseph's river, which has a general parallel direction with the main Cœur d'Aléne, and is about twenty miles south of it.

The whole valley of the Cœur d'Aléne and Spokane is well adapted to settlement, abounding in timber for buildings and for fires, exceedingly well watered, and the greater portion of the land arable. Even on the main route from Colville to the mouth of the Peluse there is much arable land for thirty miles south of the Spokane; and although in the central portion of this route trap and basaltic formations occur from time to time, yet the grazing is excellent, and the country but gently rolling. East of this line the whole country may be denominated a cultivable country. Through this portion of the Great Plain considerable ridges run from the northeast to the southwest, and the whole country has a general inclination both to the Snake river and to the Columbia. Thus on the trail from the Red Wolf's ground to the Cœur d'Aléne lake the summits have elevations of 3,338.7, 4,057.1, 3,701.1 feet, respectively, and the river valleys of 1,206.3, 2,702.8, 2,906.2, 2,795.8 feet, while on the trail from Colville to the mouth of the Peluse the highest summit level is 2,540 feet, and the country thence declines to 592.9 at the mouth of the Peluse. On the line of the Grand Coulée the highest summit level, from the point where it leaves the Columbia, is 1,642 feet, and the country thence descends to 335 at the mouth of the Snake. North of the Great Plain, that is, from the Spokane to the 49th parallel east of the main Columbia, the country for the most part is densely wooded, although many valleys and open places occur, some of them now occupied by settlers, and all presenting advantages for settlement. Down Clark's Fork itself there are open patches of land of considerable size, and so on the Koutenay river. North of the Spokane is a large prairie, known as the Cœur d'Aléne prairie, through which the trail passes from Walla-Walla to Lake Pend d'Oreille. This prairie contains some six hundred square miles. Between this prairie and the main Columbia is a mountain spur which deflects Clark's river to the north, and which may be called the dividing ridge between the lower portion of Clark's Fork and the main Columbia, and between Clark's Fork and the Spokane; between which, however, and the main Columbia are two valleys, the Colville and the Chemakane valley, connected by a low divide, a favorite route, through which passes the most generally travelled trail from Colville to the country below. Here is a line of settlements on the main Columbia itself. From Fort Colville to where it bends suddenly to the west there is a good deal of excellent land. It will be safe to pronounce the whole country north of the Spokane, and lying between the main Columbia and the Koutenay and the Cœur d'Aléne mountains, as a cultivable country, although the dense forests will be an obstacle in the way of rapid occupation of the country. But here comes in another element of wealth: the country about Colville and on Clark's Fork has been pretty thoroughly prospected for gold, and it exists in paying quantities throughout that region. On the Koutenay river are found mines of lead, copper, quicksilver, sulphur, and platinum; and there can be no question, from information derived from practical miners, from geological explorers, and especially from the testimony of the Jesuit fathers, De Smet, Hurkan, and Ravalli, that this is a country very rich in minerals. Perhaps the country east of the main Columbia has been described with sufficient minuteness, and nothing more need be said than to refer to its boundary on the south, the Blue mountains. These mountains, having a general east and west direction but a few miles south of the 46th parallel, have a course to the north to the eastern portion of the Walla-Walla, re-entering and send streams to the Walla-Walla and the Snake. These streams have pine on the upper portions, of good size and in large quantities, and will enable settlers to procure lumber for their buildings at a moderate

expense. Among the various tributaries of the Walla-Walla are Mill creek, Dry Fork, and the Touchet; and of the Snake river, the Tukanon and the Alpahwah.

The narrative of this exploration will render it unnecessary to go into minute details descriptive of these several streams, the object of this memoir being to present the general features, and deportment, and spirit of the country. It should, however, be mentioned, in connexion with the lake system of this great plain, that in the wooded region north of the Spokane are some remarkably picturesque lakes, as Lake Pend d'Oreille, on Clark's Fork, and Lake Rootham, some thirty miles northward of Clark's Fork, both of which are graphically described in the Oregon Missions of De Smet.

Coming now to the country lying between the main Columbia and the Cascade mountains, it may be necessary to describe, with some little particularity, the various streams and their several tributaries flowing into the main Columbia. A glance at the map shows that the general course of these streams is very much to the south, and between them are generally to be found high mountain spurs which run to the Columbia itself, overhanging it many hundred feet. The most considerable rivers are the Yakima, with its Pisko, its Atahnam, its Nachess, its Wenass, and other tributaries. The Pisquouse or Wenatshapam river, Lake Chelan and the Chelan river, the Methow river and the Okinakane river, which may be described as follows: The Yakima rises in the vicinity of the passes of the Cascade range, latitude 47° 15′, from several large and beautiful lakes, and, taking a general course to the southeast, runs for 160 miles to its confluence with the Columbia, in latitude 48° 05′. For twenty-five miles down the stream its valley is only from half a mile to a mile wide; it then widens out in Ketelas plain, which is ten or fifteen miles wide, the river there being ninety feet wide and about three in depth, but very rapid. Below this plain the river curves gradually to the south until it receives the waters of the Pisko, then turns again eastward to its mouth. Between the Ketelas and Atahnam, for thirty miles, the hills again encroach on the valley, but below that it again widens out to six or ten miles, with numerous branchings among the hills. On the west side, opposite Ketelas plain, three streams, the Pteh-num, Emptenum, and Wenass, rise among the hills separating the main Yakima from its principal branch, the Nachess. These streams are from 15 to 20 miles long, and run through small and fertile valleys. The Nachess rises in the vicinity of the Nachess Pass, and, running nearly parallel to the Yakima at a distance of fifteen or twenty miles, joins it after flowing about fifty miles. It has a valley from half a mile to four miles in width. The Atahnam rises about thirty miles south of it, and runs in a more easterly course, emptying about ten miles below; its valley is smaller than that of the Nachess, but fertile. The Pisko rises among the hills east of Mount Adams, and in size and character resembles the Atahnam. Only two small branches join the Yakima from the north and east, one running through the middle of Ketelas plain from the hills northward, the other running almost directly contrary to the upper Yakima from the hills east of its southerly bend. The Pisquouse and Enteatkwu, which enter the Columbia near latitude 47° 30′, are, at their mouths, rapid streams, with high falls as they descend from the hills at the foot of the Cascade range into the deep valley of the Columbia. They are supposed to head in the mountains about thirty miles northwest of it. The Chelan rises in a lake which is reported by the Indians to run for thirty miles back among the mountains, and approaches to within two miles of the Columbia, into which its outlet falls, by a series of cascades, 350 feet in this short distance, in about latitude 47° 45′.

The Methow rises by several sources in the mountains northwest of Fort Okinakane, and

running southeasterly, empties near latitude 48°. On its upper part there is a fine wide valley, but this narrows to a mile for ten miles above its mouth. The Okinakane rising in a long series of lakes north of the 49th parallel, runs nearly south for seventy miles within the Territory, joining the Columbia only eight miles above the Methow. It expands into several small marshy lakes in its course, and is generally slow and deep, but in one place, thirty three miles above its mouth, there is a fall of five feet. Its valley is fine, and the hills around well grassed, wooded, and arable. It receives a branch from the northwest near the falls, which runs through a rough, hilly country, and has some high falls near its mouth. The Ne-hoi-al-pit-quu is a stream which enters the Columbia opposite Fort Colville. It has a winding course of about seventy miles, and has numerous beautiful prairies in its valley, though the hills around, partially wooded, are also to a great extent arable. None of these rivers west of the Columbia are navigable except, perhaps, the Yakima, for part of its course at high water. Lake Chelan is doubtless navigable for many miles, but is cut off from the Columbia by the fall of its outlet. Between these rivers are spurs thrown out from the main chain of the Cascades, and extending towards and in some cases reaching the banks of the Columbia. Those between the Klikitat and Pisko tributary of the Yakima, and between the main Yakima and the Wenatshapam, or Pisquouse river, are considerable mountains; thus on the trail pursued by Lieutenant McClellan the rise from the Klikitat valley to the divide is 2,364 feet, and the descent to the Pisko 2,114 feet, the elevation of the divide being 3,633 feet above the sea. The rise from the main Yakima to the divide separating it from the Wenatshapam is 4,048 feet, and the descent to the latter stream 4,264 feet; the summit level is 5,750 feet. Here the spur comes upon the river, making the trail difficult. The country north of the great western bend of the Columbia, from the mouth of the Spokane to the mouth of the Okinakane, is much more gentle and less elevated.

Great injustice has been done this country by a want of patience and consideration on the part of gentlemen who have gone over it rapidly in the summer, and who have been over it but once ; it is impossible to speak understandingly of a country unless one has had experience and opportunities of observation in countries somewhat similar. Now, the most intelligent voyageurs and best practical farmers in that country agree in opinion that there is a large quantity of arable land throughout this country, and very superior grazing. This is the opinion of intelligent Indian chiefs who have themselves made some progress in raising crops, and who are already great stock raisers. South of the Yakima is a low divide separating its waters from the waters flowing into the main Columbia in that portion of the river where, after leaving Fort Walla-Walla, it proceeds westward. This divide has a general parallel course to the Columbia, is nearly east and west some thirty miles from the main river, and between it and the Columbia is a large body of arable land, nearly every acre of it adapted to cereals. This country has not come under the observation of a scientific party with instruments in hand, but has been much travelled over by intelligent officers of the Indian service, and by the practical agriculturists of the country. Little streams flowing from the southern side of this divide, which is well wooded all through, pass down to the main Columbia, watering the country and furnishing the means of supplying the farm and animals with water.

On the several tributaries of the Yakima, particularly towards their upper waters, the land is rich and adapted to most of the crops, and so in the valley of the main Yakima itself. This valley has been denominated by some a desert and sage plain; sage does not occur in spots and small quantities, but much of the country is cultivable and productive. It may be observed that in regard to the whole of this central portion of the Territory it will be necessary to exercise care as to seed-time, and farmers will have a disadvantage over those west of the

COLUMBIA RIVER — JUNCTION OF DES CHUTES

Cascades in their seed time being very much shorter; but with ordinary care as to the time of putting in seed no danger need be apprehended from droughts This portion of the country is wooded about half way from the divide of the Cascade mountains to the Columbia itself, but you pass up the main Yakima seventy miles before you reach the building pine, although cottonwood is found on its banks sufficient for camping purposes; but when you reach the Pisquouse, or Wenatshapam, you come to a wooded region which extends to the main Columbia. The forest growth of the upper waters of the Clearwater and of the main Columbia, from above the mouth of the Wenatshapam, furnishes inexhaustible supplies, which, after being rafted down the streams—that is, the Snake and Columbia rivers—will furnish settlements in the vicinity of those rivers with firewood and lumber at moderate rates. So great are the facilities for rafting that it almost amounts to a continuous forest along these streams. The Blue mountains, which were referred to as bordering the Walla-Walla valley on the south, have a general course westward, south of the main Columbia, until they unite with the Cascade mountains, from which flow many streams to the Columbia, the Umatilla, Willow creek, Butter creek, John Day's river, and the Des Chutes river. (A sketch is here given of the junction of the Des Chutes and Columbia rivers.) On the immediate banks of the Columbia the country is not promising; but going back a little distance the grazing is very luxuriant and excellent, and the soil rich, particularly in the river valleys. The traveller, starting from the Des Chutes river and simply passing southward a mile or two from the trail, will be struck with the freshness and luxuriance of the grass in August, September, and October, and with the arable qualities of the soil. This is especially true of the country up John Day's river; its principal tributary coming from the North Rook creek, or Butter creek, Willow creek, and the Umatilla. When this interior becomes settled there will be a chain of agricultural settlements all the way from the Walla-Walla to the Dalles, south of the Columbia, along the streams just mentioned, and north of the Columbia on the beautiful table-land which has been described to border it from the Walla-Walla westward. The Dalles is a narrow place in the Columbia river, where the channel has been worn out of the rocks, below which about ten miles is the mouth of the Klikitat river, whose general valley furnishes the route of communication with the main Yakima and the several intermediate streams, the trails pursuing a generally northerly direction. In this Klikitat valley is much good farming land.

It is also worthy of observation that gold was found to exist, in the explorations of 1853, throughout the whole region between the Cascades and the main Columbia to north of the boundary, and paying localities have since been found at several points, particularly on the southern tributary of the Wenatshapam. The gold quartz also is found on the Nachess river. The gold bearing, crossing the Columbia and stretching eastward along Clark's Fork and the Koutenay river, unquestionably extends to the Rocky mountains.

CASCADE MOUNTAINS TO COAST.

The Cascade mountains in Washington Territory are 130 miles, as an average, from the coast. The waters of Puget Sound, Admiralty Inlet, Hood's Canal, and the several channels connecting them with the Georgian bay—the whole system being popularly known as Puget Sound—lie between the Cascades and the coast. The Straits de Fuca, through which they pass to the ocean, extend eastward nearly a hundred miles, from which point the waters referred to run nearly due south as many miles more. The peninsula thus formed, lying between Puget Sound and the coast, is partly a rolling and partly a mountainous country. The Coast range

reaches a considerable altitude half the distance to the Straits de Fuca from opposite the head of the sound. The country generally, however, west of the Cascade mountains, is heavily timbered, and the prairie land is perhaps not one-third of the whole. Starting with the western coast, the principal points of interest are Shoalwater bay, an extensive body of water into which flow a number of considerable streams, and where abound shell-fish of all kinds, and especially oysters, for the San Francisco market; Gray's harbor, into which flows the Chehalis river, whose valley is the most extensive and richest of the river valleys west of the Cascade mountains. The Chehalis has its source near to the Columbia river, runs nearly due north for thirty-five miles, and then taking a general direction north of west for forty miles flows into Gray's harbor. It receives many tributaries: from the east, Newaukum and the Skookum-Chuck; and from the north, the Black river, the Satsop, the Wanoochee, and other streams. On these last-named rivers are extensive prairies and rich bottom lands. The whole country from the Chehalis to the head of the sound and the head of Hood's Canal is remarkably well adapted to farming purposes. South of the Chehalis and separated from it by a narrow mountain spur is the Willopah river, having a course nearly parallel to that of the Chehalis, and which flows into Shoalwater bay. It has a rich river valley, which, though smaller than the valley of the Chehalis, is equally inviting. Those who have passed over the trail in the Willopah valley to the Cowlitz river speak of the wooded country as being arable and adapted to farming. Around both Shoalwater bay and Gray's harbor there are extensive meadows and natural prairies, and the grass is green throughout the year. Perhaps in no month is the grass better adapted for fattening cattle than the months of February and March. North of Gray's harbor, in which also flow quite a number of streams, making the whole country about it full of resource and full of inducement for settlement, are several other streams—the Quinaiutl river, which flows from a lake of the same name, where a particular kind of salmon abound, of a small size, and which is a favorite resort for Indians. Without going into further details of the country on the coast, it may be observed that the timber lands, which cover nearly the whole surface of the country west of the Coast range, are arable and rich. The Indian agents who have traversed the country have given very special attention to this question, and have made official reports in regard to it.

Coming now to the Columbia river, there are several streams flowing into it from the north—Gray's river, the Cowlitz river, the Cathlapootle, the Washougal, and the White Salmon, the latter being east of the Cascade mountains. The Cowlitz is worthy of mention because it furnishes a route used in passing from the river to Puget Sound, navigable for thirty miles for canoes to the Cowlitz Landing, with water enough for boats some miles further up to the Cowlitz farms. It is rather a remarkable river in that country; its bottom lands are exceedingly productive and the soil literally inexhaustible. It has several branches, all flowing from Mount Saint Adams.

The Cathlapootle also flows from Mount Adams and the spur of the Cascades lying between it and Mount Saint Helen's, having near its mouth much excellent land. This river, however, cannot be said to be a navigable stream for canoes, with the exception of its lower portion for a few miles. It will not be necessary to elaborate any further the rivers flowing into the Columbia, and we will now return to the rivers flowing into the sound. These are the Des Chutes river, flowing into Budd's inlet, on which Olympia is situated; the Nisqually river, flowing into the sound at Nisqually; the Puyallup river, the Dwhamish, the Snohomish, the Skagit, the Lummi, the Neuksack, and other streams, all flowing in from the east. Of all

these rivers the largest and one of the most important is the Skagit. The Skagit has its rise in British territory, flows east of Mount Baker in a generally south course, and reaches the waters of the sound in about latitude 48° 20′, longitude 122° 25′, about fifty miles south of the 49th parallel. This river is navigable nearly up to the 49th parallel, with the exception of a small distance near its mouth, obstructed by rafts, and on its banks is an arable and productive country. The mouth of the Skagit and the vicinity adjacent is also very productive, and the land will not be difficult to clear, for the growth is small, being a sort of underbrush. The Snohomish river has several tributaries—the Stoluquamish, the Snoqualmoo, and other streams. Here is also a most excellent country, and an unusual proportion of prairie land. The Snoqualmoo Falls, fifty miles from the sound, are a great curiosity. The fall is about two hundred feet, and there is quite a body of water. Just above the falls is a celebrated prairie, known as Ranger's prairie, where there was a block-house for volunteers in the Indian war of 1855 and 1856. The Stoluquamish river also flows through prairies well adapted to cultivation, and the timber land on its banks, as elsewhere through the territory, is good. The Dwhamish river has several tributaries—Black river, which flows from the Dwhamish lake, east of Seattle, Cedar creek, flowing into Black river from the east, Green river, and White river. White river has it source in one of the passes of the Cascades, (the Nachess Pass,) and Cedar creek in another pass of the Cascades, called the Snoqualmoo Pass; and the Snoqualmoo itself also has its rise in this pass. These are the two principal passes of the Cascade mountains, the Nachess and the Snoqualmoo. The Nachess is, in round numbers, 5,000 feet above the sea, and the Snoqualmoo 3,500 feet. A peculiarity of the Snoqualmoo Pass is that the approach from the east, up the valley of the main Yakima, leads by several lakes, and finally by Lake Kitchelus, where there are two trails for crossing the pass: one trail, practicable for horses, passes over the divide south of Lake Kitchelus, and falls upon the waters of Cedar creek; the other trail passes north of Lake Kitchelus, passes over a lower divide, and falls upon the upper waters of the Snoqualmoo river. This second trail is somewhat encumbered by fallen timber, and is therefore difficult for animals; yet in 1856 it was passed over by the volunteers with animals, and a scout made by them into the Yakima valley from Ranger's prairie. This is unquestionably the best pass of the Cascades north of the Columbia river, but it is probable that there are other practicable passes to the north; and practicable passes are known to exist south of the Nachess pass. The Nachess pass is approached from the east by the valley of the Nachess river, and, as before observed, connects with White river. While this pass is entirely practicable for pack animals during the summer months, and has enabled emigrants to come into the Territory with their teams, it is, nevertheless, not so favorable as the Snoqualmoo Pass. The approach up the Yakima is much more easy and gentle than up the Nachess, and, whatever be the difficulties from the Snoqualmoo, from the western slope to the sound, they are a good deal more from the Nachess to the sound. Still the country is difficult from both passes, being heavily wooded, and there being many streams, and much work is required in bridging streams and in cutting out timber to make easy roads.

The labors of the boundary survey will develop a very interesting section of country, and may make known passes near the parallel; but it is probable that the Snoqualmoo Pass will be found to be at least fifteen hundred feet lower than any other pass, either north or south. The line of the 49th parallel crosses the Cascades at an elevation of at least five thousand feet. It then descends into the valley of the Skagit river; and it will be a question as to whether the point referred to is not on a spur, and whether the main range beyond the Skagit will not be

found to be considerably higher in altitude. It will not be necessary to give a more particular description of the other rivers flowing into the sound from the east. They are all of the same general character. In the spring the melting of the snows of the mountains causes them to be high, and the rains of the fall and winter cause them at times to be perfect torrents. They may be called ugly streams, all of them, and are a great obstruction to travelling in the country. They are all uniform, too, in the character of their valleys. This obtains with the Chehalis and Willopah and the Cowlitz, equally with the rivers of the sound. Their bottom growth is vine and curled maple, alder, and cedar. There are some small streams flowing into the sound from the west, which it is not necessary particularly to advert to in this connexion; but a considerable stream flows into Hood's Canal near its head—the Skokomish river. There is a large quantity of tide prairie near the mouth of this stream, and it has been selected as an Indian reserve, for it abounds in the food of which the Indians are fond. The Skokomish has its rise well to the north on the eastern slopes of the Coast range. It may be observed that the many inlets at the head of the sound furnish an inexhaustible supply of logs for the mills, and spars and piles for shipping. The scenery of a summer's day on one of these inlets is lovely beyond description. It is constantly changing; the high forest trees, under the soft, gentle skies of summer, mellow and transform the whole landscape, and the traveller passing from point to point is charmed by the endless succession of beautiful and ravishing scenes. There are on the sound many islands worthy of mention, the most important of which is Whidby's island, which may be called the garden of the Territory. On this island is a considerable quantity of prairie land, which at an early day was taken up by the settlers. In the woods on its southern and northern extremities is found the white deer. They are taken in great numbers by the Indians, and their venison is a favorite and much used article of food. North of Whidby's island are islands still more important, which are now in dispute between Great Britain and this country. By the treaty of 1846 it is provided that the boundary line should run on the 49th parallel to the centre of the channel between Vancouver's island and the main land; and then going southward it should continue on the main channel, separating from the main the Straits of Juan de Fuca and the Pacific ocean. The British government claim that the true channel is the Rosario channel, which hugs the main land; the American government claim that it is the Canal de Haro, which hugs Vancouver's island. The islands intermediate, valuable for their rich arable lands, for their unsurpassed pasturage, and more especially valuable for their admirable harbors—key points in time of war, and therefore important in a military point of view—are now in dispute between the two countries. They are referred to in this connexion as important points in the geography of this country.

CHAPTER XV.

HYDROGRAPHY OF THE COASTS AND NAVIGABLE WATERS OF WASHINGTON TERRITORY, PREPARED BY DR. J. G. KOHL, UNITED STATES COAST SURVEY.

INTRODUCTORY REMARKS.—MOUNT OLYMPUS.—SHOALWATER BAY.—GRAY'S HARBOR.—POINT GRENVILLE.—DESTRUCTION ISLAND.—FLATTERY ROCKS.—CAPE FLATTERY.—DE FUCA'S STRAIT.—ITS GENERAL HISTORY.—ITS SOUTHERN SHORE.—NEEAH HARBOR.—FALSE DUNGENESS BAY.—NEW DUNGENESS BAY.—WASHINGTON HARBOR.—PORT DISCOVERY.—ADMIRALTY INLET.—PORT TOWNSEND.—OAK BAY.—PORT LUDLOW.—SUQUAMISH HEAD.—HOOD'S CANAL.—DAHAP INLET.—USELESS BAY.—SKAGIT HEAD.—DWHAMISH BAY.—COMMENCEMENT BAY.—PORT MADISON.—PORT ORCHARD.—BRAINBRIDGE ISLAND.—BLAKE ISLAND.—VASHON'S ISLAND.—PUGET SOUND.—NISQUALLY RIVER.—MOUNT RAINIER.—WHIDBY'S ISLAND.—POSSESSION ISLAND.—DECEPTION PASSAGE.—GENERAL VIEW OF THE DE HARO ARCHIPELAGO.—CANAL DE HARO.—DE HARO ARCHIPELAGO.—SAN JUAN ISLAND.—HENRY ISLAND.—ORCAS ISLAND.—WALDRON ISLAND.—SKIP TCAK AND FREEMANN'S ISLAND.—SUCIA GROUP.—PATOS ISLAND.—MATIA GROUP.—BARNES'S ISLAND.—CLARK'S ISLAND.—THE SISTERS.—LOPEZ ISLAND.—DECATUR, BLAKELY, FOOST, OBSTRUCTION AND SHAW'S ISLANDS.—ONTARIO ROADS.—FROLIC STRAIT.—MACEDONIAN CRESCENT.—ROSARIO STRAIT.—FIDALGO ISLAND.—BURROW'S AND ALLEN ISLANDS.—PADILLA BAY.—GUEMES ISLAND.—CYPRESS ISLAND.—BELLINGHAM CHANNEL.—SINCLAIR'S BAY.—VENDOVI ISLAND.—BELLINGHAM BAY.—POINT FRANCIS.—ELISA'S ISLAND.—LUMMI ISLAND.—HALE'S PASSAGE.—DE LARA'S GULF.—GULF OF GEORGIA.—BIRCH BAY.—PENINSULA OF ROBERTS'S POINT.—FRASER'S RIVER.—MOUNT BAKER.

In the year 1853 that portion of the northwest territory of the United States bounded by the Columbia river on the south, the Pacific ocean on the west, the Straits of Juan de Fuca and the 49th parallel on the north, and the Rocky mountains on the east, was organized as a separate territory under the name of Washington Territory, and its limits defined and established.

The west region, now comprised under the name of Oregon and Washington Territories, was formerly known under the several names of California, New Albian, Canada, and Missouri Territory. It was designated by Vancouver New Georgia.—(See Vancouver, volume 1, page 289.) He says what he intended to call New Georgia should extend as far south as latitude 45°, and northward to the Gulf of Georgia. North of the mouth of the Columbia river the sea-coast changes its outlines and configuration as well as its general direction, and presents a different aspect from that south of the Columbia. It recedes gradually to the northward for about 130 nautical miles, assuming finally, near Cape Flattery, a northwest direction.

Cape Flattery is the most westwardly point of American territory, and the general coast line is here broken by the broad Strait of Juan de Fuca, which enters the continent in an eastwardly direction.

This section of the northwest coast between the Columbia river and the Straits of Juan de Fuca may be subdivided as regards general features at Point Grenville. South of this point the coast is sandy and low, and marked by shallow bays or lagoons. North of Point Grenville the coast is more elevated and rocky, and taends more gradually to the westward. These changes in the margin of the coast are the consequences of corresponding changes in the interior of the country.

The southern coast ranges of mountains terminate south of the Columbia river; then comes a broad, low country, through which the Columbia enters the sea, and in which are found Shoalwater bay, Gray's harbor, &c., and to the northward rises again a group of mountains of small extent, comparatively, and of which Mount Olympus is the most elevated peak, and which may

be called the Mount Olympus range. This range is isolated, and forms the culminating ridge of the peninsula between Puget Sound and the sea.

This peninsula is bounded on the west by the Pacific, on the north by Juan de Fuca strait, and on the east by the long and numerous branches of Admiralty inlet. On the south it is connected with the continent only by a narrow isthmus between the southern end of Puget Sound and Gray's harbor or Shoalwater bay. The breadth of this isthmus is about thirty-five miles, while the whole peninsula has a circumference of nearly three hundred miles.

If Puget Sound and the lagoons of the Columbia River delta were joined, the Mount Olympus peninsula would be a perfect island; perhaps this was once the case.

MOUNT OLYMPUS, 47° 47′ NORTH LATITUDE, AND 123° 22′ WEST LONGITUDE.

Mount Olympus is the most conspicuous point of the whole peninsula. It is a high peak of little more than 8,000 feet altitude, and is surrounded at its base by other lofty mountains. Its summit is covered with perpetual snow.

The mountains around its base descend gradually to hills of a moderate height, and terminate on the coast of the Pacific in low cliffs, which fall perpendicularly on a sandy beach. Mount Olympus is an isolated and conspicuous peak, which can be seen from far out on the ocean, and must have been to navigators a prominent landmark, being the first point visible to their eyes on approaching land.

The Spanish pilot, Juan Perez, was its first discoverer. He called it El Cero de la Santa Rosalia, (the Peak of Santa Rosalia.) It was afterwards called by the Spaniards La Sierra de Santa Rosalia, (the Santa Rosalia range.) This name was not, however, introduced in geography, because the Spaniards made nothing known about their early northwestern explorations.

Captain Berkely, the discoverer, may also have seen this mountain, (1787,) but we are imperfectly acquainted with his discoveries, and know not what name he may have given to it.

Captain Meares saw the mountain again on the 4th of July, 1788, and gave it the name Mount Olympus, or as he sometimes writes Olympius, and because he published and made known his discoveries and names, this name was adopted by Vancouver, (1792,) and still remains on our charts.

This mountain range has never been thoroughly explored. The altitude of Mount Olympus, 8,138 feet, is that given by Wilkes in 1841.

SHOALWATER BAY, 46° 18′ NORTH LATITUDE, AND 124° WEST LONGITUDE.

From Cape Hancock, which is a precipitous headland forming the northern cape of the mouth of the Columbia, the coast becomes at once again low and sandy, and forms a long, broad, even beach, which runs for twenty miles directly north. This beach, called the Weather beach by the inhabitants of the Territory, is probably one of the most remarkable in the world. It is about one hundred yards wide at low water, perfectly even and hard, and the huge waves of the Pacific break upon it in parallel lines for many miles, presenting a sublime spectacle.

The beach has a range of low, sandy, and wooded hills behind it, which, with the beach, form a long peninsula, separating the southern part of Shoalwater bay from the ocean.

SHOALWATER BAY is a large basin of more than one hundred square miles in extent.

The entrance to this basin is a little more than five miles wide between two low spits of land.

Cape Shoalwater or Toke Point on the north and Leadbetter Point on the south.

The entrance is filled with shoals and bars, like the bay itself. But two good channels, more

than one-half mile wide, lead into it, one on the north and one on the south; between them are the so-called middle sands.

Both these channels have three fathoms on the bar at low water, and they are easily found and quite accessible.

The interior of the basin may be divided into two parts, a northern and a southern part. The northern part presents its greatest extent from east to west, and the southern part runs for nearly twenty miles to the south and parallel to the shore. The whole is filled with innumerable shoals, banks, mud flats, and low spits of land, which, like small peninsulas, run out from the land.

The shoals are nearly all bare at low water. Between them and the said peninsulas extends a net of many navigable channels, but vessels can approach the shore in only few places.

Quite a number of small rivers and creeks empty into the bay, of which the principal are the Nasal, the Copaluks, and the Willopah.

The tides, the extremes of which are about the same as in the Columbia river at Astoria, extends from eight to fifteen miles up these rivers, but they can hardly be considered thus far navigable for small vessels.

The bay is visited principally by coasting vessels engaged in collecting oysters for the San Francisco market. The country around the bay is, like most of the interior of the Mount Olympus peninsula, heavily wooded with hemlock, fir, spruce, and arbor vitæ.

There seems to be a strong probability that Shoalwater bay once formed a part of the estuary of the Columbia river, the rocky promontory of Cape Disappointment being then an island; very narrow and low isthmuses separate the waters of Columbia river from Shoalwater bay, and the Indians have several portages over which they transport their canoes in passing to and fro.

This interesting bay was for the first time discovered and named by Captain Meares, on the 5th of July, 1788. He did not enter it, but looked into it and recognized its principal characteristics from the masthead. He states that the bay extended a considerable way inland, spreading into several arms or branches to the northward and eastward, and that the back of the bay was bounded by high mountains*.

Vancouver did not explore this bay, though he ordered an exploration of the neighboring bay, Gray's harbor. He could not even have accurately studied Meares's report, for he does not even speak of Shoalwater bay, and scarcely indicates a bay on his chart. He has only Shoalwater cape.

This may, perhaps, be the reason why the bay was so utterly neglected by subsequent navigators, and that even Wilkes, on his general chart of 1841, has not indicated this bay at all; but has, like Vancouver, only a Shoalwater cape.

The great extent and interesting nature of Shoalwater bay have only been thoroughly developed in late years by the explorations of the Coast Survey. The first good survey of this bay was made by Lieutenant Commanding Alden in 1852.—(See his minute chart of it in Coast Survey Report, 1853.) He discovered the two channels of entrance, and gave to the northern cape the name Toke Point, and to the southern the name Leadbetter Point. Perhaps for Toke Point the old name of Meares, Cape Shoalwater, to be found on so many charts, might be restored.

* See Meares's Voyage, page 164.

GRAY'S HARBOR, 46° 56′ NORTH LATITUDE, 124° WEST LONGITUDE.

From Shoalwater bay to the north for about fifteen miles the coast presents the same appearance as to the south of it, characterized by a broad flat beach, which presents a great highway between Shoalwater bay and Gray's harbor; this beach may be regarded as the extension of Weather beach, and is bordered inland by the corresponding low, heavily-wooded sand hills. At the northern end of this beach lies Point Harrison, the southern entrance cape of Gray's harbor.

Gray's harbor is a large basin of triangular shape, each side of the triangle being about fifteen miles in length.

The entrance to this lagoon lies at the middle of the base of the triangle—the opposite vertex lying to the eastward, exactly opposite the entrance, so that the whole configuration may be compared to the shape of an arrow head.

A bank extends directly across this entrance, joining the opposite capes. This bank has only one opening or passage, about two-thirds of a mile in width and from four to eleven fathoms in depth. But on the outer side this entrance has again a narrow bar with only eighteen feet depth of water.

From this point the depth increases towards the east, the greatest depth being between the entrance points of the bay, where the depth is fourteen fathoms; thence towards the interior of the bay the depth decreases and shoals very regularly to all sides of the harbor.

The shores of the bay are surrounded by broad sandy or muddy flats, which are dry at low water, and form extensive salt marshes.*

The river Chehalis enters the bay at its eastern extremity. Another small river also enters the harbor, called Gray's river.

This bay was completely overlooked by the Spaniards, by Berkeley, by Meares, by Vancouver, and by all those who visited it before the American Captain Robert Gray, who discovered it on the 7th of May, 1792. He entered it, found it to be well sheltered from the sea by long sand-bars and spits, and remained here at anchor three days, engaged in trading with the Indians. He named the harbor Bullfinch, in honor of one of the wealthy Boston merchants who had fitted him out.†

Gray appears not to have given any names to the two entrance capes of the harbor, which he probably only called North Point and South Point.

It was soon after (October, 1792) again visited by Lieutenant Whidby, one of the officers of Vancouver, who, while at Nootka sound, had heard of Gray's discovery, and who despatched his lieutenant, in the ship Dædalus, for a particular survey of the bay.

Whidby and Vancouver gave to the bay the name of the American discoverer, and called it Gray's harbor; and this name was continued because Vancouver had once published his surveys and discoveries, which was not done by the American shipmaster. It thus came that the name of Bullfinch harbor was dropped, and it is not found on any map. On some charts the name of the second explorer and the first scientific surveyor of the bay (Lieutenant Whidby) is introduced. This has been done even on American charts, but the name of Gray's harbor has at last prevailed.

*See plan of Gray's harbor, Vancouver's Atlas.

†Greenough L. C. P., 235.

Lieutenant Whidby gave the names also to the two entrance capes. He called the northern Point Brown, in honor of Captain, afterwards Admiral Brown.

This point has a hook shape, like Cape Disappointment, and affords the boldest shore found in Gray's harbor and the best anchorage.

To the southern cape Whidby gave the name Point Hanson, in compliment to Lieutenant Hanson, who commanded the Dædalus when she came out from England. On our modern American charts this name, probably by mistake, has been changed to Point Harrison. This point is much lower than Point Brown.

Whidby's survey of the harbor, the first ever made of it, is given in Vancouver's Atlas. On this survey the bay is represented as everywhere surrounded and closed by wooded hills; nothing of the river's entering it is indicated.

The agents and traders of the Hudson Bay Company, who often travel through this region from Fort Vancouver to Puget Sound, discovered to the east of Gray's harbor an Indian tribe, the Chehalis, and a river called after them the river of the Chehalis.

Commodore Wilkes, in 1841, sent out from Puget Sound Lieutenant Eld to survey this river, and also Gray's harbor, which he did. He called the northern part of the bay, which is particularly dotted with shoals without any channels, Useless Bay.*

POINT GRENVILLE, 47° 18′ NORTH LATITUDE, 124° 13′ WEST LONGITUDE.

From Gray's harbor the coast begins to trend perceptibly towards the west, but from Point Brown, for about seventy-five miles, it still presents a low, uniform, unbroken appearance.

From Point Grenville it is broken and more elevated, and the whole aspect of the coast, from here to Cape Flattery, changes. Several small rocks lie off this point, one of which is perforated.

The extremity of Point Grenville forms, as it were, a bastion of rocky bluffs, and behind this bastion a single high peak is seen. We can consider Point Grenville as the northern limit of the extensive country on both sides of the Columbia river, embracing about eighty nautical miles.

From all these circumstances, Point Grenville attracts the attention of those who come from the south, and Heceta, as well as Vancouver, when they saw it, sailed at once to it, leaving Shoalwater bay and Gray's harbor to their right unexplored. Heceta, 1775, called this point Punta de los Martires, (the Point of the Martyrs,) from the circumstance that some of the men were here killed by the Indians.

Vancouver named it, on the 28th of April, 1792, Point Grenville, in honor of Lord Grenville.

On the Spanish charts of the Sutil and Mexicana it is called Punta de la Bastida,† which may be translated the Point of the Bastion, and which contains, no doubt, an allusion to the shape of the bluffs at the extremity of the point.

Vancouver observes that a current appears to set upon this point, and thinks this to be the cause of several accidents which happened here in former times to English as well as Russian and Spanish vessels, and perhaps, also, of the remarkable occurrence of the wreck of a Japanese junk, which happened here in the year 1833.‡

* See Eld's Expedition, Wilkes, vol. 5, from page 124 to 134.

† Bastida is an engine for covering approaches.

‡ See Vancouver, vol. 1, page 211.

DESTRUCTION ISLAND, 47° 42′ NORTH LATITUDE, 124° 27′ WEST LONGITUDE.

Destruction island is the largest detached piece of land on the whole western coast between Point Conception and Cape Flattery, though it is only six miles in circumference. It lies about thirty nautical miles to the northwest of Point Grenville, the coast presenting no remarkable points between Point Grenville and Destruction island. It is distant from the main land only about two miles. The greatest length of the island is from north to south.

The island has a rocky, abrupt, somewhat elevated coast, but is nearly flat on the top, the surface presenting somewhat the form of a table-land. It presents a barren aspect, and produces only one or two dwarf trees at each end.

The part of the coast in the vicinity of this island may have been seen by Drake in 1578, who is said to have advanced as high as 48° north latitude; but we have no particulars concerning this part of his voyage.

It was first recognized by the Spanish expedition, under Heceta, 1775. Heceta, coming from the south, approached this region in the beginning of July with the intention of searching for the Strait of Juan de Fuca.

He met here with the misfortune of losing seven of his men, who were sent on shore for water and were attacked and killed by the Indians, and his boat taken. From this event a little bay or inlet on shore was called Enseñada de los Martires, (the Inlet of the Martyrs.*) Perhaps this name was chosen in allusion to the religious appellation of the day, the thirteenth of July, on which this happened, and which was the day of San Anacleto and of the five hundred martyrs.

Nararate puts the Enseñada in 47° 24′. The chart of Maurelle has, therefore, a Punta de los Martires, and indicates pretty clearly with it our Point Grenville, but subsequent Spanish charts ‡ put the Enseñada and Rio de los Martires to the north of Destruction island. This island was named on that occasion Isla de Dolores, (the Island of Sorrow,) perhaps because the officers and crew of both ships communicated there about the painful event, and had there that sorrowful consultation about the question whether they should revenge the murder of their companions or not.

To the open bay on the coast to the north of Destruction island Meares gave the name Queenhithe. Queenhithe is said to be a village on the Thames, near London. I believe, however, the predecessor of Meares, Captain Berkely, had already given this name to this locality. The name has, however, disappeared from the charts.

A view of Destruction island and the neighboring coast is contained in the Coast Survey Report of 1855.

FLATTERY ROCKS, 48° 11′ NORTH LATITUDE, 124° 43′ WEST LONGITUDE.

The coast from Destruction island northward presents a broad, open bay which affords no protection, and which, as already observed, was called by Berkely and Meares Queenhithe. The shores of the bay, as well as the coast further north, are lined with rocks.

On the Spanish charts we find in this region an Enseñada de Mojos, a little south of the 48° north latitude. This inlet and name are not only indicated on the charts of the Sutil and Mexicana, but also on other Spanish charts of about the year eighteen hundred. The English

* See Nararate, Introduction, XCIV.

† See Calendario Manuel de Mexico por 1791, p. 18.

‡ For instance, those of Sutil and Mexicana.

Admiralty charts have also a Huerto de Mojos, but I know nothing concerning the history of the name.

The most remarkable group or reef of rocks on this coast is to be found in 48° 11′ north latitude, and is called on the modern American charts the Flattery Rocks. From 48° north latitude to these rocks the coast trends directly north. These rocks form a series of irregularly shaped islets, more than twelve in number, and extending about one league from the shore. The three largest have a number of trees growing upon their tops and eastern slopes, which are not so rocky and abrupt as the western slopes towards the ocean.

The Flattery rocks have from the south an appearance somewhat like Cape Flattery. Here, as well as at the cape, the continent projects in a rounded headland, and from both these headlands stretch out chains of little rocks and islands towards the west.

On the 22d of March, 1778, Cook saw three rocks from a distance, and, flattered with the hope that he would find a harbor in their vicinity, he called them and the projecting headland Cape Flattery. He found, however, no harbor, nor did he discover the entrance to De Fuca strait, but stood off to the south and afterwards to the west and northwest. He determined, however, the latitude of Cape Flattery to be 48° 15′ west.

Captain Berkely, 1787, Meares, June, 1788, and Duncan, August, 1788, discovered the entrance to De Fuca strait and the entrance cape to the south of it, where they found an Indian village established, called Classett, and an island called Tatooche. Meares on his chart, gave to this northwest cape of our territory the name Tatooche, and more to the south, where our capes lie, he has Cape Flattery.*

When Vancouver arrived here, 1792, he passed the Flattery rocks, which he unmistakably describes at a mile distance, but he gave no name to them. He then sailed directly to the south entrance cape of De Fuca strait, where he looked out anxiously for the point which Captain Cook had distinguished by the name of Cape Flattery. He could not entirely satisfy himself about this point, but at last came to the conclusion that the point which Duncan called Cape Classett was identical with that called by Cook Cape Flattery.†

In the autumn of the same year (on the 14th of October, 1793,) Vancouver was again in this region, and again remarks that, having heard that the name Classett originated only in the name of an inferior chief, and was not a name of importance among the Indians, he resumed the appellation of Cape Flattery, which is supposed to be the original name given by Captain Cook to the south entrance cape of De Fuca strait; but, at the same time, he gave to the rocks above described the name Flattery Rocks. On the American charts the names of Vancouver have been adopted; but the English admiralty, who, with a great degree of probability, think that Vancouver was not exact in his views, and that Cook saw only the Flattery Rocks and nothing of the entrance of De Fuca strait, adopt on the admiralty charts Cook's old name of Cape Flattery for the Flattery Rocks, and name the southern cape of De Fuca strait, with Berkely, Meares, and Duncan, Cape Classett.‡

On the old Spanish charts the Flattery Rocks are usually called Islas los Deseados, which is probably intended as a translation of the English Flattery Rocks.

A view of these rocks is contained in the United Coast Survey Report for 1855.

* See Duncan's chart, published by Dalrymple.

† Vancouver, L. C., page 218.

‡ Vancouver writes Classett, while Duncan writes Claaset.

CAPE FLATTERY, 48° 23 NORTH LATITUDE, 124° 40′ WEST LONGITUDE.

From Flattery Rocks the coast runs for about eleven nautical miles to the north, with a final trend to the west, and then turns abruptly to the eastward, forming the pointed headland named Cape Flattery. This short section of the shore is abrupt, rocky, and lined with small islets. There are on this coast some small indentations, bays, and points, which have received names on the old Spanish admiralty charts, and which are to be found under the same names in the modern English charts. Puerto Alara, Cape Alara, Point Niseo, are such names. Señor Alara was a Spanish officer, occasionally mentioned about the years 1792 and 1793, as being occupied with explorations in those regions from Nootka sound. These names are not, however, found on our American charts.

The configuration of Cape Flattery may be described in the following manner:

The whole system of the Mount Olympus range of mountains, which has its highest peak far in the interior, near Hood's Canal and the Mount Olympus peninsula, terminate at Cape Flattery towards the northwest. Between De Fuca strait and the Pacific coast this peninsula becomes gradually narrower, and finally terminates in a small headland which, at its extremity, curves slightly to the westward.

This small headland is somewhat separated from the large peninsular to which it is annexed. First, on the north by a small bay, called Meares's harbor, which is connected by a valley with the low land and marshes to the south of the cape. This valley is densely wooded, but through it runs a small stream which, at the highest tides, renders Cape Flattery practically an island. This island has a somewhat triangular form, the base of the triangle being attached to the continent, and the opposite vertex projecting boldly into the Pacific Ocean, forming the cape called Cape Flattery.

The cape is five or six hundred feet high, and falls off to the water by steep, rocky, bluffs. The extremity of the cape is, furthermore, broken up into a series of rocky islets, which stretch for about three miles out into the Pacific.

These islets diminish in size with the distance from shore, Tatooche island being the nearest and largest, and Duncan Rock the outermost and smallest.

The natural features of this cape are in many respects similar to the locality described as Flattery Rocks, but there are also distinguishing features; the promontory of Cape Flattery is higher, its islands are lower and more flat-topped. The islands of Flattery Rocks are wooded; the Cape Flattery islands sustain nothing but a growth of grass.

We will first give a general outline of the history of the cape, and then consider the parts of which it is composed separately.

Though the cape may have been approached or seen at a distance by former navigators—by Drake, who is said to have advanced as far north as 48° north latitude; by Juan de Fuca, who is said to have entered the strait of which this is the southern headland; by old Dutch navigators, who pretended to have found an entrance somewhere in this region—still it is a remarkable circumstance that this extreme point of the coast of America has been comparatively a late discovery.

Point Conception, Cape Mendocino, Cape Foulweather, Flattery Rocks to the south, the capes of Vancouver's island, and other capes to the north, were known long before this cape was mentioned.

Many Spanish as well as English exploring expeditions, before the year 1787, passed along this coast from the south far to the north without perceiving this headland.

It is true that the Spaniards had a kind of pretension to an early discovery of the cape, made in 1775. The Spanish pilot, Juan Martinez, who accompanied in that year the expeditions of Heceta and Bodeja, said that he remembered to have seen on that occasion, beyond 48° north latitude, a cape and an entrance. But he said so only after the undoubted discovery of the cape and entrance by the English fur traders, (after the year 1787.)

In the accounts of the expedition of 1775 we find no allusion to this event, and on Maurelle's chart of this expedition no such cape or entrance is found.

Nevertheless, the Spaniards, who believed the fact, gave on their charts to this point, in honor of the pretended discoverer, the name Punta de Martinez.*

Though this cape projects far into the ocean, still there is to the north land which trends still more to the westward, the highlands of Vancouver's island, the shores of which run far out towards the northwest.

This cape lies thus, as it were, hidden in a wide bay. Vancouver's island is so elevated that the navigator sailing from the south gets sight of it first, and Cape Flattery must appear partially covered by these highlands.† This may, to a certain degree, explain the late date to the discovery of this cape.

Captain Berkely (1787) is the first from whom we have certain knowledge that he saw the cape and sailed to it from the south coast of Vancouver's island, where he was engaged in trading with the Nitinat Indians. He appears to have adopted for it the name Cape Classett, at least he mentioned an Indian village of that name in the vicinity of the cape.

Captain Meares (June, 1788,) followed the track of Berkely, of whom he had received information concerning it. He saw the cape, but called it Tatooche.

Captain Duncan (August, 1788,) was the first who made a chart of the cape, and gave it the name Cape Claaset.‡

He gave, also, a view of the cape, which, however, is very imperfect and fanciful. The American captain, Gray, rounded the cape again in 1789. He appears to have adopted for it the name Cape Flattery. At least so we find it named on the chart Captain Ingraham made after information derived from Gray.§

Vancouver, as already related above, arrived at this cape in October, 1792, and named it Cape Flattery, because he thought it to be the point to which Cook gave this name. He surveyed the cape and its vicinity for the first time accurately, and put on his chart the name Cape Flattery.

After Vancouver, geographers seem to have been divided with respect to the name to be given to the cape. The English Admiralty adopt the name of Duncan and Berkely, Cape Claaset; which is, strictly speaking, the name given to it by the real first discoverers. The American charts adopt the name of Vancouver, and call the promontory Cape Flattery.

TATOOCHE ISLAND is, as was before remarked, the largest of the islands of Cape Flattery. It is a small rocky, table-land, of an oblong shape, with steep shores and a flat top. It is half a league in surface, has a verdant appearance, without, however, bearing trees. A cove divides it nearly into two parts. It is united to the promontory by a ledge of sunken rocks, over which the sea often breaks with great violence.‖

* See, for instance, the charts of the Sutil and Mexicana.

† See view of Cape Flattery and the highlands of Vancouver's island on the charts of the United States Coast Survey.

‡ See the chart in Dalrymple

§ See a copy of this manuscript chart in our collection.

‖ Vancouver, volume 1, page 217.

The rocks are conglomerate, but one part of it is basalt. One of the rocks between the island and Cape Flattery rises considerably above the water. It was called by Duncan the Pinnacle Rock, and was said to be that famous rock column which is mentioned in the old reports on the pretended discovery of Juan de Fuca, and which was considered to be the very landmark of the Strait of Juan de Fuca. Duncan gave a view of this rock, and made it so column-like and conspicuous that he must have drawn it after Hakluyt and after nature. Vancouver could find nothing like this Pinnacle rock.

Duncan names this island Green island, probably from its verdant appearance.

Vancouver called it in his report the Island of Tatooche, but he has no name for it on his chart. The name was derived from an Indian chief on the cape, who is often mentioned in the account of Meares, Vancouver, &c., and sometimes named Tatoochee, or Tatoochie, or Tootoosh.

The Spanish accounts of that time, for instance those of Quimper, one of the first Spanish explorers of De Fuca straits, often mentioned an Indian chief Tutusi, which is probably the same on their maps; therefore, also, this island is named Isla de Tutusi.*

A somewhat similar name of an Indian chief of De Fuca straits is mentioned in the account of Valdes and Galiano, namely, the chief Tetacus. Jewitt, who was long a prisoner among the Indians of Nootka Sound, year 1800, also mentioned an Indian chief Tootoosh; the name is in some instances corrupted to Tatersh. Some Spanish navigators† called the island Isla de la Punta de Martinez, (the Island of Martinez Point.)

DUNCAN'S ROCK lies north, 8° west from Tatooche island, at a distance of not quite one mile. It rises first above the surface of the water, and the surf breaks over with great violence. Between it and Tatooche island is a clear passage. Vancouver called it Duncan's Rock because he wished to commemorate this captain's name, whose excellent sketch he had on board. The English captain, Kellet, who surveyed this island in 1847, has on his charts still another smaller rock, about twelve miles to the northwest of Duncan's Rock, which he calls Duntze Rock, after Captain T. A. Duntze. No such rock has been found by the United States Coast Survey.

DE FUCA STRAIT.

SOUTHERN SHORE.

General history of the Strait of Juan de Fuca, 48° 20′ *north latitude, from* 124° 45′ *to* 122° 48′ *west longitude.*

The Strait of Juan de Fuca is the most remarkable inlet of the whole Pacific coast of the continent of America. It is bounded on the north by the southern shore of Vancouver's island and other smaller islands, and on the south by the northern shore of the Mount Olympus peninsula. On the east it is terminated to a certain extent by the western shore of Whidby's island.

The strait has its western entrance between Cape Flattery, on the south, and Bouilla Point, a point of Vancouver's island, between Port San Juan and Nitinat sound, on the north.

Its general direction is from east to west, and its length is about eighty nautical miles. It sweeps at first somewhat to the southeast from Cape Flattery, and then turns more directly to the east.

* See for instance the maps of the Sutil and Mexicana.

† For instance, Galiano and Valdes, in their account, page 42.

The north and south shores of this strait are parallel as far as the southern end of Vancouver's island, or to about the middle point of its length. Up to this point the strait has a general width of about eleven nautical miles. From the Race Rocks on the north, and Freshwater bay on the south, exactly the middle point of the whole extent, the strait widens about twenty nautical miles, and afterwards presents more the aspect of a broad interior basin. It is no longer bounded by straight parallel shores, but branches out into several broad passage bays and channels.

There are, therefore, two very distinct divisions of the Strait of Juan de Fuca—a western division, between Cape Flattery and Cape Church, which may be called De Fuca strait proper, and an eastern division, between Cape Church and Whidby's island, for which there ought to be a particular name. Upon the Coast Survey charts it may be regarded as a part of what is called Washington sound. This name appears also to include the great central channel of the De Haro Archipelago.* De Fuca strait is very deep throughout its whole extent. In mid-channel its average depth is one hundred fathoms, and this depth is carried near shore on both sides. It commences shoaling perceptibly at a distance of two miles from shore; and in all the channels and branches of this strait the depth is equally great.

There are no impediments to navigation throughout the whole extent of this strait. A deep sea bank is found at the entrance of the strait, which is a favorite fishing bank for the Indians in the vicinity.

La Perouse speaks of a bank in the latitude and longitude of the entrance, though the capes were hidden by a fog.

He has this bank marked on his chart of the northwest coast. Captain Broughton† also speaks of this bank, and remarks that it bears west by north three or four leagues from Tatooche island. It was examined by Lieutenant Commanding Alden, of the United States Coast Survey, in 1855, who found upon it a depth of forty fathoms. It may exert, however, some influence on the currents of ocean, and may divide those that enter the strait. The only exceptions to the general free navigation of the strait are a few kelp-fields which are found in the eastern part of the strait, and which are usually formed upon rocky bottom, with comparatively low soundings upon them. Four such kelp-fields have been discovered and marked upon the charts of the Coast Survey. One, south of San Juan island, at a distance of two miles from the shore, in latitude 48° 25′ north, longitude 122° 57′. It is about two miles in circumference, and has a depth of three fathoms of water upon it. Another lies south of the same island, at a distance of seven miles from it, in latitude 48° 22′, longitude 123° 3′, of about three miles in circumference, and has a depth of five fathoms.

A third lies west of Whidby's island, four miles from shore; it is about three miles in circumference, with a depth of from seven to ten fathoms of water.

A fourth and much larger kelp-field lies west of Smith's island, and this little island, with its kelp and sand banks, is quite conspicuous. It lies quite separate from all other islands, and we will give a description of it here, because it may be regarded as a particular feature of the cape itself.

Smith's Island lies nearly in the middle of the broad eastern extension of De Fuca strait, latitude 48° 19′, longitude 122° 52′. It is very small, being only a little more than a mile in

* See chart of Washington sound, Coast Survey Report, 1855.

† Broughton's Voyage, L. C., page 55.

circumference. It terminates to the east, in a narrow sand bank of about a mile in length, and not more than six feet broad. This sand bank rises from the water and forms the eastern extremity of the island. Thence the island rises gradually, and increases in breadth to the west; it attains, however, no greater altitude than fifty feet, with perpendicular bluffs of clay and gravel. Its surface is covered with a growth of bushes.

A small part of the above-mentioned bank to the east of Smith's island is always above water, and is called Minor island. At very low water both islands are connected. Between these islands, on the north side of the bank, good anchorage is found.*

The kelp-field attached to Smith's island on the west is the largest on De Fuca strait. It has a triangular form, with a pointed angle to the west of about four nautical miles in circumference, with average soundings of about from six to eight fathoms. Smith's island lies exactly in the central line of De Fuca strait, and has always been considered a landmark for entering the strait The Spanish officers of the Sutil and Mexicana, in the year 1792, mention it as such. It is now the site of a light-house erected by the United States government.

The island was discovered by De Francisco Elisa in 1791, and named Islas de Bonilla, (Bonilla islands,) after a certain Spanish officer, Antonio de Bonilla.

Vancouver puts down the island without a name. Wilkes (1841) called it Blunt's island, after Lieutenant Blunt, who surveyed it with him and discovered an extraordinary configuration of the island, which had not before been truly recognized.

Smith's island is probably a name introduced by the Hudson Bay Company. It is now in general use. A special survey of this island was made in 1853 by Lieutenant Commanding James Alden, United States Coast Survey, whose sketch of it was published in the Coast Survey Report of 1854.

Upon the currents and wind of De Fuca strait few observations have been made. Wilkes† says that the winds for a greater part of the year blow directly through the strait, and generally outward, and sometimes very violently. Lieutenant Wood, of the Pandora, says, on the contrary, that the prevailing winds of the strait are from the southwest, making the northern shore a lee shore.‡

The tides of the strait seem to be affected by various causes, and are, consequently, subject to great irregularities.

The shores of the strait in the western part are bolder than those in the eastern, and on the southern side the land rises higher than on the northern, where it ascends more gradually.

In the eastern division of the strait are found numerous beautiful harbors, which are not so frequent in the western part and in the strait proper. * * * * *

It is not at all improbable that the entrance to this broad strait was seen by early navigators, of which we have lost the original historical accounts. That a certain Greek pilot, in the Spanish service, Juan de Fuca, (or Apostotos Belerianos,) entered a strait in about this latitude in the year 1592, was generally believed during the seventeenth and eighteenth centuries, and on nearly all the maps of that time, therefore, a strait was laid down between 45° and 48° north latitude. It was usually called by geographers De Fuca strait, or the supposed strait of Juan de Fuca. It was at one time supposed to be the same as the so-called Strait of Anian, which was supposed to be the western end of Hudson bay, and to open the passage to the North American continent.

It is even possible that a navigator not only entered De Fuca strait, but also its southeastern

* Coast Survey Report, 1855. † Wilkes' Exploring Expedition, vol. 4, p. 296. ‡ Nautical Magazine, 1851, p. 317.

branch, (Admiralty Inlet,) and that such a navigator seeing that Admiralty Inlet ran directly south, thought it might be the northern part of the Gulf of California, and that in this manner the report and idea originated that the whole of California was an island. This is all possible, but there is no authentic proof of it whatever. The first navigator whose tracks can be followed with the sure light of history did not reach the latitude of De Fuca strait; Ferrelo Cabrillo, (1543,) Viscaine, (1603,) and Aquila reached about forty-three north latitude as their northern limit.

Drake approached nearest to the strait; in 1579 he returned from forty-eight degrees north latitude.

The first of the modern northwest coast explorers, from 1774 to 1787, all passed the latitude of the strait, but did not see it, probably, because its entrance is somewhat hidden by the appearance of a large bay between the west shore of Washington Territory and the southwest shore of Vancouver's island which stand toward each other at an angle of about 120°, in the interior corner of which the strait enters.

Perez, 1774, passed the mouth of the strait at a distance of sixty nautical miles, sailing from California directly to Vancouver's island (to Nootka Sound.)

Bodega and Quadra, 1775, approached this strait as near as Drake, in 48° north latitude, where they saw the coast near Destruction island. But from there they, also, passed the mouth of the strait without seeing it, and sailed directly to the coast of Vancouver's island. It is true one of their pilots, Martinez, thought afterwards that he remembered to have seen the mouth of the cape on this occasion, but this is not proved.

Cook, 1778, passed this strait, like Perez, at a distance of sixty nautical miles, from northern California to Nootka Sound.

La Perouse, 1786, came very near to the entrance of the strait, and discovered there a deep sea bank, but probably cloudy weather prevented him from discovering the strait. He has, however, on his maps here *dètroit soup çonné*, (a suspicion of a strait,) if this is not an addition of the editors of his map.

Captain Berkely, the commander of a fur trading expedition, who explored the inlets and channels of Vancouver's Island, 1787, to the south of Nootka Sound, for the fur trade with the Indians, was the first who, undoubtedly, not only saw the strait, but also crossed over its mouth. He unhappily published no report and chart of this discovery, but made, however, some communication about it to his countryman, Captain Meares, of the English Fur Trading Company, to whom he, also, seems to have suggested the idea that this might be the famous De Fuca strait of the old chart.

Meares, following the track of Berkely, visited this whole region, and also the strait again in the year 1788; he explored, also, the interior strait a little further, sending a boat, under the command of his mate, Robert Duffin, into it.

Very soon after Meares, in August, 1788, Captain Charles Duncan arrived at the mouth, and made a sketch of it, in which, however, only the very entrance in the vicinity of Cape Claaset or Flattery is laid down, with some degree of minuteness.

All the interior part of the strait, for about thirty miles eastward, is laid down on this chart with uncertain outlines, as if the shores had been seen from a distance.

This chart by Duncan was the first special chart ever published of the strait.

It was made on the 15th of August, 1788, and published by Dalrymple on the 14th of January, 1790. The name of Strait of Juan de Fuca is given to it in the title.

Meares published in his great work, in the year 1790, his own as well as Berkely's and Duffin's discoveries and observations on the strait. This work and chart are a little later than that of Duncan. Meares's chart is dated 28th of November, 1790. But the strait is already prolonged on it towards the east, and the bend in its central part is indicated. In the year 1789, the American captain, Robert Gray, entered the strait, and passed, as he himself asserts, as far as fifty miles up into the interior.*

Mr. Greenough believes that soon after Gray, (1789,) the American captain, Kendrick sailed through the whole strait, and came out again through Queen Charlotte's sound; but this cannot be proved by historical documents.

The Spaniards, soon after, made a series of explorations, by which the whole strait was thoroughly reconnoitered, surveyed, and laid down on charts. The first of these expeditions was that of the ship Gertrudis, in the year 1789, under Don Gonzalo Lopez de Haro, sent out by Don Esteran Martinez, the Spanish commander at Nootka, who, as I have already said, believed himself to be the first discoverer of the entrance of the strait. Some authors think that not Haro, but Don José Maria Narvaez, commanded this expedition.

The Gertrudis sailed along the southern shore of Vancouver's Island, as far as the entrance of De Haro's strait. The next year, (1790,) the strait was explored by Don Manuel Quimper, who passed along the southern shore as high as Puerto Quadra, or our Port Discovery.

In the year 1791 a third Spanish exploring expedition entered the strait under Captain Francisco Elisa and Joseph Narvaez, who passed for the first time through the whole strait, and entered to the north of the Gulf of Georgia. Their ne plus ultra was about the mouth of Fraser's river.

In April, 1792, Vancouver, who was not acquainted with all those Spanish explorations, entered the strait and again surveyed it. He explored, also, many branches of it, which the Spaniards had omitted, (for instance, the interior of Admiralty Inlet,) but he also omitted several harbors which his Spanish predecessors had already explored, (for instance, the harbors on the south shore, between Port Discovery and Cape Flattery.)

In June, 1792, a fourth Spanish expedition, particularly destined for De Fuca strait, the expedition of the ships Sutil and Mexicana, under Captains Jaliano and Valdes, entered the strait. But they could not add much to a knowledge of the western part of the strait, which had been already pretty well explored. They finished, in company with Vancouver, the survey of the Gulf of Georgia.

During the present century, the officers of the Hudson Bay Company have explored the strait in every direction, but have published little or nothing about their operations.

In the year 1846 Captain Kellet, in the ship Herald, and Lieutenant Wood, in the ship Panderer, again explored many parts of the strait, especially its northern shore.

In the year 1852 the operations of the United States Coast Survey were extended to this region, and detailed surveys are now actively progressing. Preliminary charts of most of the important harbors, passages, and inlets have already been executed and published. The strait has always retained the name it now has.

* These assertions are given in Vancouver, vol. I, p. 214.

It is very probable that De Fuca strait, from its remarkable geographical position, will, in course of time, prove to be the most important entrance from the Pacific ocean on the whole northwest coast of America. It will surpass, with respect to commercial and naval advantages, all its rivals to the north and south. It is the outlet of that great and fertile valley into which Admiralty Inlet branches, filling it with innumerable excellent harbors, and the greatest facilities for navigation. And also of that still greater northern valley which is partly occupied by the Gulf of Georgia.

The valley of the Fraser's river, therefore, must also be considered as an appendage of De Fuca strait, and as having there its real oceanic embouchure.

Furthermore, the entrance to the Columbia river, with its sand banks and breakers, will at all times be inconvenient, compared with the broad, deep, safe navigation of De Fuca strait; and when these countries become densely settled, and railroads come to their aid, a great part of the trade of the Columbia river valley may possibly be drawn towards Puget Sound.

The great North Fork of the Columbia, which, for the greater part of its upper course, flows upon the parallel of De Fuca strait, will soon be connected with it. That river, to a distance of about seventy miles, flows directly to Admiralty Inlet; it then turns by a right angle to the south and west, and reaches the sea after a most circuitous route of more than 400 miles; and besides, this water communication is very much interrupted by cataracts and rocks. The isthmus between Admiralty Inlet and the angle of the Clark's Fork may be traversed by roads and perhaps by canals, so that the whole northern half of Columbia river may become dependent on De Fuca strait. Even the lower regions of the Columbia have a near approach to salt water by Puget Sound.

Finally, the North Fork of the Columbia river carries with it, so to speak, the Upper Missouri, which flows along the same parallel, and brings the navigable waters and fertile valleys of the east very near to it. This is not so much the case with the South or Lewis's Fork of Columbia river.

This immense system of commercial connexions we see, even now as it were, foreshadowed on our railroad maps, where one of the principal projected lines which commenced at Chicago and Lake Superior has its western terminus at Puget Sound and De Fuca strait.

THE SOUTHERN SHORE OF DE FUCA STRAIT, 124° 4′ ————, 122° 13′ WEST LONGITUDE.

The southern shores of De Fuca strait are hills, in the immediate neighborhood of the water, of a moderate height. Many low sandy cliffs fall perpendicularly on beaches of sand and stone. From the top of the cliffy eminences the land takes a further gentle and moderate ascent, and is entirely covered with trees, chiefly of the pine genus, until the forest reaches a range of high craggy mountains, which seem to rise from the woodland country in a very abrupt manner, with their summits covered with snow. The northern shore is not quite so high. It rises more gradually from the sea side to the tops of the mountains of Vancouver's Island, which gives to them the appearance of a compact range, more uniform and much less covered with snow than those of the southern side.* The eminences with which the whole coast is lined have nearly all, more or less, the same form. They form little peninsulas, which all point to the northwest. The northeastern sides of these peninsulas are long, the northwestern short, and between two neighboring points lies usually a little bay, the shores of which are low and sandy.

* Vancouver, vol. I, pp. 220, 221.

Taking a more general view of the coast, it may be said to be developed in a straight line from west to east, without any far projecting headlands and peninsulas, and without deep and long bays and indentations.

Nearly all the bays and harbors along the shore are broad, shallow, and afford no good protection. Only towards the eastern part some deep inlets appear, which become deeper and longer the more we advance to the east. First, New Dungeness harbor; then Discovery harbor; then the very long Hood's Channel; and last—the longest and widest of all—Admirality Inlet.

The latter two great inlets will be considered in a particular chapter, and we will adopt Wilson Point as the terminus of this particular section of the coast.

NEEAH HARBOR, 48° 21′ NORTH LATITUDE, 124° 37′ WEST LONGITUDE.

Of all the small bays of this section Neeah harbor is the most interesting, and has been longest known. It is a well protected bay near Cape Flattery, and has been visited by all who have explored the vicinity of the cape.

On passing Cape Flattery and entering the strait, the rocky shore recedes to the south and again turns towards the east, forming a little bay, which is closed on the northeast by a small island called Waadda island or Wyadda island.

A narrow but safe passage for vessels of ordinary draught separates this island from the main land. The body of the bay itself contains no hidden dangers, and has regular soundings from 12 to 5 and 4 fathoms depth of water.

The eastern part of the bay shore is low and sandy, but the western part is lined with a ledge of rocks projecting irregularly above the bottom. This ledge of rocks is partly lined with a field of kelp, which affords protection against the swell of the sea. The best anchorage for large vessels is close to the kelp, but smaller vessels can anchor at all seasons in the channel between the shore and Waadda island.

This bay may be considered as a part of the valley which runs behind Cape Flattery from De Fuca strait to the Pacific ocean. The bay is about four miles deep, and along the inner shore lies an elevated beach, upon which the famous Indian village Claaset, which gave its name to the locality, was situated. This beach is the site of an Indian village to this day.

The first chart on which Neeah bay was laid down is that of Captain Duncan of the 15th of August, 1788, but it was imperfectly represented, and without a name. That Waadda island is indicated (though not in its right place) is sufficient proof that Neeah bay is meant. Duncan did not pass to the eastward of this bay. The Spaniards were the first to know a little more about it. It was called by them, as early as 1790, (during the expedition of Quimper to De Fuca strait,) Puerto de Nunez Gaona, the port of Nunez Gaona.

In April of the year 1792 Vancouver passed the bay. He mentions and describes it in his report, but gives no name to it, and did not find it worth his while to anchor there, because he was in expectation of finding better ports to the east.*

Soon after, in the summer of 1792, the Spanish marine officer, Don Salvador Fidalgo, was sent to this port from Nootka to establish a Spanish settlement and erect fortifications.

Some weeks after the port was again reached by the expedition of the Sutil and Mexicana, (June, 1792,) the officers of which had an interview with Fidalgo.† They say that the Indian name of the harbor was Quinacarnot.

* Vancouver, vol. I, p. 218.

† Sutil and Mexicana, pp. 29, 30.

Greenough says that the American traders call this harbor Poverty Cove, but on the manuscript chart of the Americans, Gray and Ingraham. I find the name Poverty Cove given to San Juan's harbor, on the northern shore of De Fuca strait. They (Ingraham and Gray) call this harbor Fidalgo's cove. I suppose the name Neeah harbor was first introduced by the Hudson Bay Company.

Wilkes, who in 1841 surveyed the harbor, gave it the name Port Scarborough, in honor of Captain Scarborough, an officer of the Hudson Bay Company, who gave some assistance to the American exploring expedition; but the little island to the northeast of the bay he called Neeah Island.

To different points or capes of the bay he gave the names Point Hilcome, the Western Cape, Newell Point; in the middle of the harbor, Point Lewbough, and Village Point to the east.

Captain Kellet, of the English royal navy, surveyed the harbor again in 1847 and called it Neeah Bay. He names the little island, Wyadda Island, Wilkes's Point Hilcome, Koikla Point, and Village Point, Mecena Point.

The author of the account of the voyage of the Sutil and Mexicana, in his dictionary of the language of Vancouver's Island Indians, has a verb "ne-as," which he translated by "salis," (to sail out.) May not this word perhaps have something to do with the appellation of the island and harbor Nee-ah?

Lieutenant Alden and Mr. Davidson surveyed again the harbor in 1852, and they adopted more of Kellet's than Wilkes's names. The eastern cape of the bay they called neither Village Point nor Mecena Point, but Baadah Point, because they found out that the name of the neighboring Indian village was Baadah. Their interesting and beautiful survey of the bay and of the whole section of the south shore of De Fuca strait, from Duncan's Rock on the west to Kashu Kuddil Point on the east, is contained in the Coast Survey Report of 1853.

FALSE DUNGENESS BAY, 48° 7′ NORTH LATITUDE, 125° 27′ WEST LONGITUDE.

The coast from Neeah bay sweeps at first a little to the southeast, and turns then with a gentle bend directly to the east along the parallel of 48° 18′ north latitude. It forms innumerable little points and bays, of which some were explored and named by the Spaniards. But False Dungeness, 60 nautical miles distant from Neeah, is the first harbor of importance.

The names of the old Spanish admirality charts of 1795, along this section of the coast, are, from west to east, the following:

Emenada de Roxas (the Bay of the Red Women) is about 24 miles to the east of Puerto de Nunez Gaona, (Neeah bay,) and is probably our Callam bay. The Spanish officers of the Sutil and Mexicana give for it as the Indian name Isfuat.*

After this comes Ensenada de Soto, which is called Callam bay in the surveys of Kellet and Woods. Then Rio Canil, (the River of Coarse Bread.) It is called to this day Canil river. The Spanish officers of the Sutil and Mexicana gave it the original Indian name Chismil.† Further: Rio de Ceusto, (the River of Gradual Descent,) the same perhaps as our Crescent bay. The Indian name of this inlet is said by the Spaniards to be Sejachio.

* Sutil and Mexicana, p. 42.

† Sutil and Mexicana.

Enseneda de Davila, (Davila's inlet.) This is a larger bay, and is probably the Freshwater bay of the American and English charts.

All these Spanish names originated partly in Quimper's, partly in Elisa's exploring expedition to this shore, (1790, 1791.) The Spanish officers of the Sutil and Mexicana give for it the original name Ucunas.

False Dungeness is, so to speak, the first attempt of nature on this coast to form a good harbor. A low sandy and very narrow spit of land sets out from the coast and runs east about three miles. It forms and bounds with the coast a bay of two miles broad and of a regular oval shape. The harbor has surprisingly deep soundings of from 20 to 10 fathoms from its eastern entrance to its western end, and is also deep from north to south, and extremely well protected against the west, north, and south.

The harbor was discovered by either Quimper, (1790,) or by Elisa, (1791,) and called by them Puerto de los Angeles, (the Harbor of the Angels.) The name was retained by Vancouver and likewise on the English admiralty charts, and this is therefore doubtless the true name of the harbor.

On the Coast Survey charts it is called False Dungeness, no doubt because the configuration of the port has some similarity to that of New Dungeness, in the neighborhood. It was surveyed and sounded in the year 1852 by Lieutenant J. Alden, United States navy, assistant in the Coast Survey. On his chart, which is to be found in the Coast Survey Report of 1853, the Spanish name is retained only to the eastern extremity of the long sandy bay which covers the bay or Ediz Hook.

NEW DUNGENESS BAY, 48° 12′ NORTH LATITUDE, 123° 10′ WEST LONGITUDE.

From False Dungeness the coast extends a little to the north and sweeps back to the east, throwing out again a long spit of low sandy land very similar to that by which False Dungeness is formed. It lies at the northern extremity of a pretty large peninsula.

From the long sandy spit of land which covers the port to the north a branch runs out towards the south, which nearly closes the inner half of the bay and makes the entrance to it very narrow. The outer open part of the bay is deep and affords shelter against the west and northwest.

The bay was discovered by Don Manuel Quimper, in the year 1790, and named after him Bahia de Quimper, (Quimper's bay.) He called the long projecting cape or sandy tongue Puerto de Santa Cruz, (the Point of the Holy Cross.)

Vancouver, who, as I have said, ran quickly along this whole shore east from Cape Flattery, looking out for some more spacious and commodious harbor, did nothing for the particular survey of all the bays and indentations of the coast just named, which, however, had been explored and named before him by the Spaniards, of whose explorations Vancouver knew nothing, having with him only an imperfect sketch or beginning of a sketch of De Fuca strait, by Captain Duncan.

This locality was only recognized by Vancouver in passing, and at a distance. It appeared to him to be something like the situation of Dungeness in the British channel, and he therefore called the sand promontory New Dungeness, (April, 1792.)

Wilkes called the bay New Dungeness Roads.

WASHINGTON HARBOR, 48° 5′ NORTH LATITUDE, 123° 3′ WEST LONGITUDE.

From New Dungeness bay the coast falls directly off to the southeast for the distance of 10 miles, and a very hidden and deep basin now called Washington harbor. The interior part of this basin is covered to the north by two projections, and there remains only a very narrow entrance a few hundred yards in width, which is not easily discovered. Before this entrance is a broad open space which may be called the exterior part of the bay.

The interior basin of Washington harbor is remarkably deep. It has from 9 to 20 fathoms depth, and is protected against all winds. In another position it would be a most valuable port, but in this region there are so many superior ports that even so good a one as this becomes of second rate importance.

Quimper and Elisa (1790, 1791) looked into this bay, though they seem to have had no idea of the existence of an interior basin. They have here the name Ensenada de Bertodano, (Bertodano's inlet.*)

Vancouver sailed by this port without noticing it at all. He has on his charts no indication of it whatever.

Probably the port first became known to the Hudson Bay Company. Wilkes says that he sent a party to survey the coast (about the 20th of July, 1841) between New Dungeness and Protection island,† though he does not give the result of this exploration in his account. Still there is no doubt that it was on this occasion that the interior harbor was for the first time regularly surveyed. He has it plainly indicated on his chart. I do not know whether the name Washington harbor was introduced by Wilkes or not, but this name is now adopted on all our charts.

PORT DISCOVERY, 48° 5′ NORTH LATITUDE, 122° 55′ WEST LONGITUDE.

From Port Washington the coast runs again for a few miles to the east, and then again falls back to the south and forms another long and deep basin, Port Discovery, very similar to the former, but much larger. This bay is about six miles long from north to south, and throughout 2 to 2½ miles wide from east to west. It is very deep, and has regular soundings from 30 to 35 fathoms in mid-channel to 10 fathoms close to the shore. In some parts it is almost too deep for an anchoring place. The entrance of the port is formed by two low projecting points, Challam Point, to the west, and Cape George, to the east. This entrance is much broader than Washington port. Woodland cliffs of a middling height bound the coast of the interior basin. It is protected from all winds, and especially those of the north and northwest, by a little island, Protection island, which is two miles from the entrance and covers it.

"Had this insular production of nature," says Vancouver, "been designed by the most able engineers, it could not have been placed more happily for the protection of the port."

From all this it is evident that this bay forms one of the safest and best harbors in the world. It is also very easy to fortify it against the attempts of an enemy. The first discoverers of it were, beside this, enchanted by the beauty of the surrounding landscape.‡

* See Spanish Admiralty charts, 1795.

† See Wilkes's Exploring Expedition, vol. 4, p. 484.

‡ Vancouver, vol. 1, p. 226.

Don Manuel Quimper was the first who discovered and entered this bay, (1790,) and who called it Puerto de Quadra. It was the ne plus ultra of Quimper's progress in De Fuca strait.* Don Francisco Elisa visited the port again in 1791, and continued the name of Puerto de Quadra, given to it in honor of the Spanish explorer Don Juan de la Bodega y Quadra. The Spanish officers of the Sutil and Mexicana assign to it as the original Indian name, Chlayarnat.†

Vancouver, who in search of a convenient port arrived here in April, 1792, and was unacquainted with the explorations of his Spanish predecessors, believed himself to be the discoverer of this beautiful harbor. He made it for a period the station of his ships, and called it after one of them Port Discovery; and as he made his discoveries known throughout the world, this name has remained to it ever since.

The little island before the port had been called by the Spanish discoverers Isla de Carrassco, (Carrassco's island.) There was among Quimper's men El Piloten Don Juan Carrassco, (the pilot's mate Don Juan Carrassco.‡) Perhaps the island was called after him.

The island is a small detached piece of land, which, like the other islands near the coast of Washington Territory, resembles a table-land; its summit presents nearly a horizontal surface, an extensive lawn with luxuriant grass, and falls off to the water in perpendicular cliffs. From its good protecting qualities with respect to Port Discovery, it was called by Vancouver Protection island, (April, 1792.) The Spanish officers of the Sutil and Mexicana visited it soon after Vancouver, (June, 1792.)

They say that the original Indian name of the island was Chachanucah.§

From Port Discovery the coast runs again a few miles to the east, and at Point Wilson falls off to the south, and forms another basin similar to those of Ports Washington and Discovery, and another peninsula similar to that which divides the last-mentioned two ports. But this harbor, called Port Townsend, opens towards Admiralty Inlet, of which it forms a part, and we will take it into consideration in connexion with that subject.

ADMIRALTY INLET, FROM 47° 3′ TO 48° 12′ NORTH LATITUDE, 122° 30′ WEST LONGITUDE.

Admiralty Inlet is a most curious, irregular, and complicated compound of inlets, channels, and bays, which leads to a narrow entrance from the southeastern corner of De Fuca strait.

The principal body of these waters, taking the whole as one mass, runs in a directly north and south line through more than a whole degree of latitude; but branches run out from it in all points of the compass, and fill a region 70 nautical miles in length from north to south and 30 miles in breadth from east to west.

It may be compared to a tree, of which the body is recognizable, which is called Admiralty Inlet proper, and the side branches have their particular names.

On the whole west coast, from San Diego to the north, nothing like this is met; but from De Fuca strait higher up the entire northwestern coast offers many other complicated channel systems very similar in their principal features to this. All the water channels of which Admiralty Inlet is composed are comparatively narrow and long. They have all, more or less,

*Manuscript journal of Quimper's voyage, in the library of State Department, Washington.

†Sutil and Mexicana, p. 42.

‡He is mentioned in the manuscript journal of Quimper's voyage, United States State Department, and he is also mentioned as one of the officers who afterwards signed a paper on the Spanish taking possession of the harbor of Nunez Gaona.

§See their report, &c., page 42.

bold shores, and are throughout very deep and abrupt, so much so that in many places a ship's side will strike the shore before the keel will touch the ground.* Even in the interior and most hidden parts depths of 50 and 100 fathoms occur, as broad as De Fuca strait itself. Vancouver found 60 fathoms near the Vashon island within a cable length of the shore, and in Possession sound he found no soundings with a line of 110 fathoms. Our modern more extensive soundings prove that this depth diminishes towards the extremities of the inlets and basins, and we will speak of it more at the particular descriptions of each part. A high tide goes up from De Fuca strait into all these sounds. Even at Nisqually, the most southern part of Admiralty Inlet, the spring tides are 18 feet high and the neaps 12.†

Nothing can exceed the beauty and safety of these waters for navigation. Not a shoal exists within them; not a hidden rock; no sudden overfalls of the water or the air; no such strong flaws of the wind as in other narrow waters; for instance, as in those of Magellan's strait. And there are in this region so many excellent and most secure ports that the commercial marine of the Pacific ocean may be here easily accommodated.

The country into which these waters enter, and of which they fill the lowest and central parts, may be said to be a broad valley between the Mount Olympus range to the west and the Cascade range to the east; the high snow-covered peaks of both ranges may be seen from the waters everywhere. They stand at a distance of about 100 nautical miles from each other. The broad valley between them is, upon the whole, of a moderate elevation, and presents a pretty level depression. The higher spurs of the two mountain ranges do not come down to the water's edge. The shore lands in the immediate neighborhood of the channels may therefore be called only hills. They are partly handsomely wooded, partly covered with luxuriant grass. In this respect Admiralty Inlet differs from other similar sounds of the west coast to the north, where these sounds sometimes cut right into the heart of the high mountains, and offer some of the boldest, wildest, and most picturesque coast scenery to be seen in the world.

The Admiralty Inlet valley or depression goes still on to the south, with a gentle bend to the southwest, towards the Columbia river. Between both waters no high mountain range intervenes, because the Mount Olympus range is a perfectly isolated system. It is from this, as I have already observed above, very possible that the northern waters once went right through, were connected with the Columbia river, and made of Mount Olympus peninsula an island.

All the waters comprised under the general name Admiralty Inlet may be said to consist of the following five divisions:

1st. The entrance as high up as Suquamish head, where the principal separation begins.

2d. Hood's Canal, or the great western branch.

3d. The principal body of Admiralty Inlet proper, from Suquamish head as far south as to the narrows near Point Defiance, where the great body of the water ends.

4th. That southern cluster of sounds and inlets which is connected with Admiralty Inlet only by a very narrow channel, and which is called Puget Sound.

5th. Possession sound, the great northeastern branch of Admiralty Inlet, which conducts into Rosario strait.

* Wilkes, vol. 4, page 304.

† Wilkes, vol. 4, page 305.

THE ENTRANCE OF ADMIRALTY INLET.

Our geographical nomenclature, unhappily, has not been organized by men who had the whole finished map of the country before them, who could analyze the different geographical objects into their component parts and subdivisions, and could give appropriate and special names; else no doubt that northern part of Admiralty Inlet between Wilson and Suquamish Points would have received its proper name. It forms in a certain degree a basin itself.

On the north it is separated in a marked manner from De Fuca strait, and to the south the waters branch out in different directions. For want of another name we may call it Admiralty Inlet Entrance. It forms a basin fifteen miles long from north to south, and ten miles broad from west to east, with a large island and peninsula and three harbors (Townsend, Oak Bay, Port Ludlow) on the western shore, and several open bays on the eastern shore.

Quimper says, in his journal, that from his Ne Plus Ultra (at Port Discovery) he saw other inlets and openings to the east, which he called Boca de Fidalgo and Boca de Flon. He had, however, no time to explore them.

Don Francisco Elisa, who advanced in 1791 to the eastern end of De Fuca strait, recognized for the first time this inlet, and called it Bocas de Caamona, (the Inlet of Caamona,) probably in honor of the Spanish navigator Caamona, who was then preparing for his great northwestern expedition, which he executed in 1792. On all the old Spanish charts Admiralty Inlet Entrance is called Bocas de Caamona, while they only call the further large interior body of the waters Canal del Almerantzago, (Admiralty Inlet.)

It would not only have been just to the discoverer, but also very convenient, if we had adopted this manner of denomination.

Elisa, however, did not further explore the interior of this inlet, because he understood from the Indians that, though it was very long, still, from the end of it, one could not advance further unless with canoes.* Elisa's object was not to explore shut-up inlets, but to find a passage to other waters. The original name of this entrance was ascertained by the Spaniards to be Quenchenas.†

Vancouver sailed into the entrance (on the 7th of May, 1792) with three boats, on a boat excursion from Port Discovery, where his ships were stationed. He gave to it the name of Admiralty Inlet, but he extended this name to the whole broad channel to the south.

Vancouver and his officers, in repeated excursions, surveyed for the first time all the principal branches connected with this inlet.

As the sea otter was not found in these waters, the American and English fur traders seldom or never explored them.

It was not surveyed by a scientific expedition for half a century after Vancouver.

The agents of the Hudson Bay Company became acquainted with the channels, but they have published no works or charts on it.

The American exploring expedition under Captain Wilkes made for the first time, after Vancouver, (1841,) an extensive survey of the whole, and completed discoveries in several parts, which we will describe more particularly hereafter. Since 1853 the United States Coast Survey has been extended over this field, and already many special charts of harbors and inlets have been published.

Point Wilson is the northeastern extremity of the hilly peninsula between Port Discovery

* Sutil and Mexicana, p. 35. † Ibid.

and Admiralty Entrance. It was named so by Vancouver, in honor of Captain George Wilson, of the British navy.*

Point Partridge is the most eastern headland of Whidby's island. It forms a white sandy cliff, received its name from Vancouver, and has ever since retained it.

PORT TOWNSEND.

Port Townsend forms a basin which is, in all respects, similar to the western basins of Port Discovery and Port Washington. Like them it extends from north to south about ten miles; like them, has very regular deep soundings, from 104 to 20 fathoms, and good holding-ground. It forms a most safe and spacious harbor. To the east it is covered and separated from Admiralty Entrance by a peninsula and by Craven's island. It forms a high, steep cliff of a rich species of marrowstone, and Vancouver, who examined it on the 8th May, 1792, therefore called it Marrowstone Point.†

Craven's island itself was not named by Vancouver, though he recognized it to be an island. It received its present name from Wilkes. It is about six miles long from north to south and a mile broad, and is separated by Long Harbor from a similar peninsula to the west.

Long Harbor is a narrow channel five miles long, which branches out from Port Townsend, and empties through a very narrow and shallow passage to the south into Oak bay. It was first navigated through by Vancouver. Lieutenant Johnstone thought he might return to the north by Oak bay and Port Townsend, but he found these two bays separated and closed by a narrow isthmus.‡ The Indian name of the channel is Kelisut.

The eastern coast of Port Townsend is formed by a detached piece of country very similar to Craven's island, which has no proper name on our charts, but might be called Townsend peninsula.

Port Townsend itself received its name from Vancouver, in honor of the Marquis of Townsend, one of the lords of the English admiralty who signed Vancouver's instructions. In the year 1854 an accurate survey of this port was made by the United States Coast Survey, the results of which were published in the Coast Survey Report of 1855.

OAK BAY.

Oak bay is a small harbor to the south of Port Townsend, from which it is separated by a narrow isthmus. Vancouver explored it on the 9th of May, 1792, and named it Oak bay because some of his young men on an excursion on shore had seen some high and beautiful oak trees.

PORT LUDLOW.

Port Ludlow is a little bay in the southwestern end of Admiralty Entrance to the northwest entry of Hood's Canal. It is slightly indicated on Vancouver's chart, but without a name. Wilkes surveyed it in 1841 for the first time, and called it after Mr. Ludlow, United States naval officer of the war of 1813, who was killed on board the Chesapeake.

An extensive survey of this port was made in the year 1854 by Messrs. James Alden, Davidson, and Lawson, from the United States Coast Survey, and a chart of it published in Coast Survey Report of 1856.

The bays and headlands on the eastern side of Admiralty Entrance are not very well defined,

* See Vancouver, vol. 1, p. 291.

† Vancouver, vol. 1, p. 235.

‡ Vancouver, vol. 1, p. 233.

not very deep and projecting, and they therefore have received no particular names by the great navigators and surveyors on their charts, though they have local names.

From this the only exceptions are made by Admiralty Head and Ariel's Point. Admiralty Head is a very marked headland of Whidby's island to the east of Wilson Point. It received its name of modern origin, probably from its vicinity to the entrance of Admiralty Inlet, and it may be called the interior entrance point of this inlet, whilst Partridge Point, on the same side, may be considered to be the exterior entrance cape.

Ariel's Point is the southern end of the east coast of this basin. Vancouver had no name for it.

SUQUAMISH HEAD

marks the southern entrance of this basin, and is the point where Admiralty Entrance begins to separate into two branches. It forms a high, perpendicular bluff, which terminates towards the north in what is usually called the great peninsula, and which divides Hood's Canal from Admiralty Inlet. This point was named by Vancouver Foulweather Bluff because he experienced there a disagreeable change of weather. Its present Indian name may have been given to it by the Hudson Bay Company.

Hood's Canal forms a very curiously-shaped sound, which branches off from Admiralty Entrance towards the southwest, between Port Ludlow and Suquamish Point. Its main body runs directly from the northeast to the southwest, with a length of about forty nautical miles, and a width of from one to two miles.

In the midst of its length a smaller inlet branches out to the north, and in its southern part suddenly turns around to the east and northeast under a very pointed angle, and finally ends in a long and narrow appendage.

Hood's Canal is throughout very deep, 50 to 60 fathoms in mid-channel, but in its eastern appendage it shoals from 30 to 5 fathoms. A strong tide runs up and down in the channel, the water of which rises to 10 feet.* The shores are alternately composed of sandy or rocky cliffs, falling abruptly into the sea or terminating on a beach, whilst in some places the even land extends from the water side with little or no elevation.† The banks on both sides are formed of stratified clay, and do not exceed 100 feet in height.‡

The whole country surrounding this branch is less attractive and diversified, and of a more uniform appearance, than that on the other parts of Admiralty Inlet.

Vancouver discovered and explored this canal in its principal parts, in a boat expedition, from the 10th to the 14th of May, 1792. He gave to it the name Hood's Canal, after Lord Hood, one of the lords of the English admiralty who signed his instructions.

It was again surveyed during the latter part of June, 1841, by a boat expedition commanded by Lieutenant Case, sent out by Wilkes from Nisqually. Case discovered parts of the bay which had been overlooked by Vancouver.

The principal points, capes, and divisions of the canal are the following:

Port Gamble is a little basin attached to Hood's Canal, on the eastern side, not far from the eastern entrance. It has a very regular, oval shape, with a narrow entrance with soundings of from 5 to 7 fathoms. It is indicated on Vancouver's charts, though without a name. Wilkes named it after Mr. Gamble, a United States naval officer in the war of 1813.§ In the year

* Vancouver, vol. 1, p. 243. † Vancouver, vol. 1, p. 238. ‡ Wilkes. § Verbal information.

1855 Lieutenant Alden, United States Coast Survey, made an extensive survey of it, which is published in the Coast Survey Report of 1856.

Suquamish Harbor is a bay opposite Port Gamble, on the western shore of Hood's Canal. It has a triangular shape, and a long island lies before it. The name Suquamish, also given to the above-named point, is derived from an Indian tribe of this name, often mentioned in this region.

Nickolowan Point is the southern extremity of a long peninsula which separates Hood's Canal from Dahap Inlet. It was reached by Vancouver on the 11th of May, 1792, and named Hazel Point, in consequence of its producing many of those trees.* Wilkes named this cape Takutska Point.† Its present Indian name was probably introduced by the Hudson Bay Company.

Dahap Inlet is the largest and broadest branch of Hood's Canal. It branches off from it to west of Nickolowan Point, and runs ten miles to the north towards Port Discovery. Vancouver explored it on the 11th of May, 1792. Though small, it has the extraordinary depth of from 60 to 70 fathoms nearly to its northern end. A northwestern branch of it, not mentioned either by Vancouver or by Wilkes, was discovered in modern times, and called Colicee Inlet.

Treesald Cove and Sebec Harbor are two small bays opposite each other, to the south of Dahap Inlet.

Vancouver went as far as this point, and sent from there his lieutenant, Johnstone, to the east to see whether Hood's Canal was there closed, or whether it continued still in that direction. Johnstone reported that the canal here ended in a cove. The eastern appendage of the canal, twelve miles in length, which in this manner escaped him, was discovered by Lieutenant Case, of the United States exploring expedition, who found that it was separated from Puget Sound by an isthmus only 2½ miles broad, and who also discovered on this isthmus a small lake called Kellum's lake.

THE MAIN BODY OF ADMIRALTY INLET.

The main body of Admiralty Inlet branches off from the entrance basin at Suquamish Point. It runs at first through a more narrow passage between that point and Ariel's Point to the southeast, and then widening, trends directly to the south.

Sending out different branches, particularly to the west, and embracing several small and large islands, it ends at Point Defiance, at the so-called Narrows, which separates it from Puget Sound. It is about 46 miles broad, and 40 nautical miles long.

Vancouver entered these waters on the 19th of May, 1792, in his large vessel, the Discovery, and explored it in all its principal parts.

Wilkes, in 1841, again surveyed it, and discovered some bays and islands which had been overlooked by Vancouver, or to which he did not give true configuration.

Useless Bay is a wide, open bay, to the east of Suquamish Head, on the southwestern shore of Whidby's island. It is not indicated by Vancouver, and it received its present name, I believe, from Wilkes.

Skagit Head is the most southern headland of Whidby's island, so called from an important tribe of Indians, the Skagits, which inhabited and possessed the whole of Whidby's island. Vancouver, though he of course saw it, has no name for it, either in his report or on his

* Vancouver, vol. 1, p. 239.

† Wilkes, vol. 4, p. 44.

chart. Its Indian name was probably introduced by the Hudson Bay Company. East of this head Possession sound branches out, which we will describe hereafter. Point Edmund is a low and broad point, somewhat projecting from the eastern shore, south of the entrance of Possession sound. This point was not named either by Vancouver or by Wilkes. The present name appears to be of modern origin.

Dwamish Bay.—From Point Edmund the eastern shore runs nine miles south, then forms a very pointed headland called West Point, from which it turns abruptly to the southeast, and forms Dwamish bay, one of the principal and most useful harbors of the whole inlet. The bay is six nautical miles long, in a southeastern direction, and about two and a half miles broad. It branches off from Admiralty Inlet between West Point on the north and Point Roberts on the south. The greater part of it is very deep—80 to 30 fathoms—but the southeastern extremity of it is filled with broad sand-banks, probably carried into it by the Sammamish river, which empties into the back part of the bay through several arms.

The bay is slightly indicated on Vancouver's charts. He gave it very little attention, and did not name it.

Wilkes surveyed it for the first time, and named it Elliott's bay, after one of his officers. It was again surveyed by the officers of the English admiralty, and the admiralty charts have for it the Indian name, Sammamish river. This name is, on the United States Coast Survey charts, only given to the river. The bay was again surveyed by Lieutenant James Alden, of the Coast Survey. He calls it Dwamish bay, which name has, however, long been in use on the spot itself. On the northwestern shore of the bay a little town or settlement has sprung up called Seattle, and a little anchorage near it is named from it Seattle harbor.

Commencement Bay.—The coast from Point Roberts runs for about fifteen nautical miles nearly directly to the south without making any well-marked bay; then it turns to the southwest, and forms at last in 47° 17′ a deep and spacious inlet, called Commencement bay. This bay has more or less a square form.

With a southwestern and southeastern angle, it spreads out into a valley which seems to come down and to open here from the Cascade mountain range, where a corresponding opening or indentation south of Mount Rainier is observed.

Vancouver, who entered this bay on the 26th of May, 1792, observed from afar that opening in the eastern range corresponding to the bay, and he therefore believed there might be a channel cutting through the mountain and having eastern communication. He was, however, soon undeceived in this, and reached the end of the bay, of which he gives a handsome view in his work.* He gave no other name to it than the south part of Admiralty Inlet.

Lieutenant Ringgold, sent out by Commander Wilkes in the ship Porpoise on a surveying expedition from Nisqually to the north, commenced his survey in this bay on the 15th of May, 1841, and he therefore called it Commencement bay. The little river emptying into the eastern corner of the bay is called Puyallup river, which is about sixty nautical miles long, and comes in a northwest direction from the Cascade mountains, where it rises on the western slope of Mount Rainier. The western shore of Admiralty Inlet is throughout formed by the eastern coast of what is here called the Great Peninsula. This is a large tract of country between Hood's Canal and Admiralty Inlet. It has, upon the whole, the configuration of a triangle, or a leaf attached to the continent without a stem.

* See Vancouver, vol. 1, p. 268.

It is everywhere surrounded by water with the exception of one point, namely, at that narrow little isthmus upon which Kellum's lake is situated, and which we might call Kellum's Lake isthmus. On this western shore of Admiralty Inlet, south of Suquamish Head, may be mentioned the following inlets, harbors, points, and islands:

Point No-Point, five miles to the east-southeast of Suquamish Head. I believe it was so called by Wilkes.

Apple Cove is a very small bay seven miles to the south of Point No-Point.

Port Madison is a pretty spacious harbor a few miles to the south of Apple Cove. This port appears to have been perfectly overlooked by Vancouver. Lieutenant Ringgold explored it, and probably gave to it its present name.

The port has in its inner corner an outlet or passage of about 200 yards wide, which conducts to the interior parts of Port Orchard. Port Orchard is a very much secluded and interior basin to the southeast of Port Madison. It may be said to consist of a principal body and four or five branches running out from it in different directions like the legs of a spider.

The northeastern of these branches opens into Port Madison by a narrow channel called Agatha's Passage.

The northwestern runs up a few miles into the interior of the country, and ends in a shallow and narrow bay.

The principal body of Port Orchard runs from north to south, and turning towards the southwest ends there, in the interior of the great peninsula, in a similar manner.

From its southern port still another branch runs to the northwest called Dyes Inlet, which is the most western water of the principal body of Admiralty Inlet.

A fifth branch of Port Orchard runs out towards the southeast and opens into a widely open bay, in the midst of which lies the little Blake's island.

Even these secluded branches of Admiralty Inlet have still water deep enough for the largest class of vessels, and afford superb and well-protected harbors. The only danger is a reef of rocks which is nearly in the middle of the southern entrance.*

Port Orchard was discovered and entered through the south entrance on the 24th of May, 1792, by Mr. Orchard, one of Vancouver's officers, when the ships of Vancouver had their central station for all their Admiralty Inlet operations at a point near the entrance. Mr. Orchard surveyed the whole in one day, and did not discover the northeastern outlet into Madison harbor or Agatha's Passage, and also not Dyes Inlet.

Mr. Ringgold, on his above-mentioned northern survey from Nisqually, spent nine days in the survey of this port, (May, 1841,) and discovered what Vancouver had overlooked.

Dyes Inlet was named after one of the officers of Wilkes's exploring expedition.†

Bainbridge island is a large island to the east of Port Orchard, and cut off from the continent by the two above-named outlets and exterior harbors of that basin.

On the east it is bounded by Admiralty Inlet. It is about eight miles long from north to south, and four broad from east to west.

On the eastern side it has two little harbors, Eagle harbor and Port Blakely. This latter one, north of Restoration Point, has been minutely surveyed by the United States Coast Survey, and the chart of it is contained in the Coast Survey Report of 1856.

* Wilkes.

† Verbal information.

Vancouver, who saw only the southern outlet of Port Orchard, did not recognize that it was an island, and represented it as a part of the continent.

Ringgold, by sailing through the narrow Agatha's Passage, proved it to be an island, and it was named Bainbridge island, after Mr. Bainbridge, a United States naval officer, under the command of whom Wilkes had once served.

The southwestern extremity of the island is the best known point of it in the history of exploration. It rises abruptly in a low cliff about 12 feet from the water side. The surface presents a beautiful meadow covered with luxuriant herbage. Vancouver saw this point on the 19th of May, 1792, and called it at first Village Point, because he found an Indian village on its western extremity. To the south of this point, and under the cover of it, he anchored for a longer period of time, and made it the central station and rendezvous of his boat expeditions for the exploration of all the waters of Admiralty Inlet. Afterwards he changed the name of Village Point, and called it finally Restoration Point, having celebrated that memorable event whilst at anchor under it.* This point I believe should receive again its old name in our marine charts.

Blake's Island.—This little island lies south of Point Restoration. Vancouver sailed around it, but could not come to anchor there, because he found nowhere less than sixty fathoms within a cable's length of the shore.

He gave no name to it. It was named by Wilkes, I believe, in compliment to Captain Blake, United States navy.

Vashon's island is an island similar in size and configuration to Bainbridge island. It is ten miles long from north to south, and four in width from west to east.

It is separated from the great peninsula by a channel somewhat similar to Port Orchard. This passage, as well as also the insularity of this island, was at once discovered by Vancouver from his station at Point Restoration. He sent his lieutenant, Puget,† through the said passage to the west of this island, which he called Vashon's island, after his friend, Captain Vashon, English navy.‡

By the officers of Wilkes's exploring expedition it was discovered that the southeastern portion of this island is only connected with it by a narrow sandy isthmus at low water, and separated at high water, and that it ought to be called an island of itself.

The name Maury's island was given to it, after one of the officers of the exploring expedition.

Point Defiance and the Narrows.—Point Defiance is the long, low extremity of a little peninsula of the most southern part of Admiralty Inlet. It marks the limits between this great inlet and Puget Sound, and these limits are further marked by a contracted passage near this point, called the Narrows. Through these Narrows the tide runs with great velocity, causing many eddies and whirlpools, through which the vessels are carried with extraordinary rapidity.§

* See the proofs for all this in Vancouver, vol. 1, pages 259, 260, 279. It is to be observed that the latitude which Vancouver gives in his report (page 279) to this point, 47° 30′ N., does not agree either with our present latitude of the southeast point of Bainbridge island, or with the latitude which Vancouver gives to it in his charts. Notwithstanding this, there is not the slightest doubt that his Restoration or Village Point is the point designated by me.

† Vancouver, vol. 1, p, 260.

‡ Vancouver, vol. 1, p. 275.

§ Wilkes, vol. IV, p. 304.

PUGET SOUND & M^T RAINIER FROM WHITBY'S ISLAND

PUGET SOUND, 47° 12′ NORTH LATITUDE, 122° 50′ WEST LONGITUDE.

Puget Sound (see sketch) forms a most variegated compound of narrow inlets and sounds, interlinked among each other by passages and channels, and connected with Admiralty Inlet only by the above named Narrows. A number of peninsulas and islands are cut out by those different water branches.

The broadest and longest division of those waters is that into which Nisqually river empties from the south, and which follows from these two directions for long distances—one to the northwest, and one to the northeast. These two broadest and longest branches of the whole cluster, which form an angle before the mouth of Nisqually river, are considered to be the main body of the whole, and are usually called Puget Sound, par excellence, whilst the shorter and minor branches have their own proper names.

The eastern branch of this, Puget Sound proper, has, towards the southeast, from Point Defiance to Nisqually river, (fifteen miles distance,) a very straight shore line.

On this southeastern shore lies, however, one remarkable bay or harbor, Steilacoom harbor, called so from the little Steilacoom river, which empties into it. In late years the flourishing town Steilacoom has sprung up on the shore of this harbor. The harbor was minutely surveyed (1855) by the United States Coast Survey officers.

Their chart is contained in the Coast Survey Report of 1856; but the northwestern shore is cut up into three large islands:

Rosario island, Duntze island, Fisgard island, by three channels, of which the central and broadest is called Bruce channel.

Bruce channel turns afterwards to the north, and ends in a broad sound, which is called Carr's Inlet, and loses itself in the interior of the Great Peninsula.

The second or northwestern main branch of Puget Sound runs from the mouth of Nisqually river in a straight direction for about twenty miles N.NW., and at last ends in a closed narrow inlet, called Case's Inlet.

The eastern shore of this northwest main branch is without any well defined bay or side branch. Between it and Carr's Inlet a long peninsula is cut out, which ought to have a name.

On the western side of this second main branch two narrow and long passages run out, which conduct to a complex system of western branches and inlets.

The southern of these two passages is named Dana's Passage.

Between these two passages lies the great Hartstene island, to the west of which they unite again.

From the waters behind (to the west of Hartstene island) branch out four narrow and long inlets, to the west Hamersly Inlet, to the W.SW. Totten Inlet, to the SW. Eld Inlet, to the south Budd's Inlet. All these inlets—each about eight nautical miles long and one-half to one mile broad—and likewise the long, narrow peninsula between them trend to one central point, in which they are united like the roots of a tree.

The southern extremity of Budd's Inlet constitute the most southern waters of Admiralty Inlet.

Vancouver despatched, on the 19th of May, 1792, from his central station at Restoration Point, his lieutenant, Peter Puget, through the channel west of Vashon's island, who passed through the Narrows, which Vancouver named, after the discoverer, Puget Sound.

Puget, in company with Whidby, surveyed, in boats, nearly all the intricate passages of this sound during a fortnight, from the 19th to the 27th of May.

These officers remaining out longer than was expected, Vancouver himself followed in boats, taking, however, the eastern and southern shores, because he thought they might have confined themselves to the western and northern shores.

Vancouver, in this boat expedition, reached, on the 28th of May, the southernmost point of our present Budd's inlet, which we mark still on our present charts with "Vancouver's farthest," and where, in late years, the promising town of Olympia has sprung up.

From here Vancouver returned to the north, to his central station at Restoration Point, thinking that Puget would have done the rest. Many parts of Puget Sound were in this manner doubly surveyed by Puget and by Vancouver himself.

Wilkes gave names to all the inlets of this sound which, in Vancouver's report, had not been named. Nearly all the names which he gave them were in compliment to the officers of the squadron, as Budd's inlet, Eld's inlet, Totten's inlet, Case's inlet, Hartstene's inlet, Pickering Passage, Peal Passage, Dana's Passage, Carr's inlet, &c. Some of the names also were given in compliment to the officers of the Hudson Bay Company, as, for instance, Anderson island, McNeil island, Ketron island.

These names of the American Exploring Expedition, for the greater part, have been adopted by the Coast Survey, but it is very likely that all these inlets, islands, and points, had other local names given to them by the Hudson Bay Company, who have had, since 1830, a fort or settlement in the very centre of them, at the mouth of Nisqually river, and who were perfectly familiar with them.

The whole of Puget Sound was surveyed again in later years by R. M. Inskip.

A comparison of the charts of Wilkes and Inskip gives, with respect to names, the following result: The Anderson island of Wilkes is called by Inskip Fisgard island; McNeil island, Duntze island; Ketron island, Kittson island; Fox island, Rosario island; Drayton pass, Crawford channel; Park pass, Moore's bluff.

Inskip has added the following names: Thompson cove and Rodd bay for little harbors on Fisgard island; Ryder channel and Bruce channel for passages between the islands; Scarboro' shoals for certain shoals to the south of Fox island; Heath bay for a cove to the northeast of Kittson or Ketron island; Gordon Point for a cape in the same locality. Some of Inskip's names have been preferred on our Coast Survey charts to those of Wilkes.

Nisqually river is the most important river which enters Puget Sound. It is about sixty miles long, and comes in a northwestern direction from the Cascade mountains, where it rises between Mount Rainier and Mount St. Helens. It runs perfectly parallel with Puyallup river, which empties into Commencement bay, and is in size and every other respect similar to this. Its name was introduced into geography by the Hudson Bay Company, who have had, since 1830, a fort at its mouth called Fort Nisqually. At the mouth of the river lies a bank called on Wilkes's chart Mud flat, and in Inskip's Inskip bank.

In the English parliamentary documents on the subject of Vancouver's island the name of the river and the fort are usually written Nasqually.

Mount Rainier (see sketch) is one of the highest and most prominent peaks of the Cascade

Stanley, from Sketch by Dr Cooper

Sarony, Major & Knapp Lith. 449 Broadway N.Y.

MOUNT RAINIER VIEWED FROM NEAR STEILACOOM

range. It has an altitude of 12° 33'.* It stands in about 46° 40' north latitude, and 121° 27' west longitude, and seems to form the southern pillar and landmark of a large section of the Cascade range, which begins in the north with Mount Baker and branches out from this knot in several branches.

The main range makes here an angle and turns to the southwest to Mount St. Helens. It stands at a distance of about fifty miles from the southern parts of Admiralty land and Puget Sound; but it is visible from all parts of these waters, and may be said to be their landmark for taking bearings.

The mountain was first discovered by Vancouver in the beginning of May, (about the 7th,) of 1792, from Port Townsend. He named it in honor of his friend, Rear Admiral Rainier.†

POSSESSION SOUND AND WHIDBY'S ISLAND, FROM 47° 08' TO 48° 26' NORTH LATITUDE, 122° 35' WEST LONGITUDE

Possession sound and the waters which form its continuation constitute quite a separate part of Admiralty Inlet, or rather an intermediate section of water between Admiralty Inlet and Rosario strait. These waters begin in the north in Deception Passage, and stretch down from there nearly forty miles in a north and south direction, which seems to be a straight continuation of the main body of Admiralty Inlet. They are to the west separated from De Fuca strait and Admiralty Entrance by Whidby's island.

Whidby's island is the largest island of this whole region. It is about 30 nautical miles from north to south, and about two to five miles broad from east to west. It has a very irregular form, two broad ends, and a very narrow main body. It is separated on the north by Deception Passage from Fidalgo island; on the west it faces De Fuca strait, of which it forms the eastern shore, and to the west-southwest it forms the eastern shore of Admiralty Entrance; to the east it forms the western shore of Possession sound and Port Gardner, and has here various headlands and inlets.

The island is occupied by a numerous tribe of Indians, the Skagits, who have many villages in it. It presents in many parts a delightful prospect, spacious meadows, beautiful pastures adorned with clumps of trees, principally oak. The island was, of course, first seen by the Spaniards Quimper and Elisa, but was not recognized as an island.

Vancouver's officer, Whidby, explored all the surrounding waters of the island, and by circumnavigating it proved it to be an island, (May and June, 1792.) Vancouver, therefore, called it after him. It has ever since retained his name.

The waters to the east of Whidby's island, for which, as forming an independent section, we ought to have a general name, and which I may designate with the name given to an essential part of them, Possession sound, branch out in their central part into two principal branches, of which the western is called Port Gardner, and the eastern Port Susan. These two branches surround a large island called Caamano island. They show, consequently, the greatest expansion in their central parts. They contract as well to the north as to the south, and have communication with other channels, by Deception Passage with the northern, by the more particularly so called Possession sound with the southern waters.

The Spaniards appear never to have entered these waters, though they observed the northern

* After Wilkes.

† Vancouver, vol. I, p. 235.

entrance to them. Vancouver sent out for their exploration from his central station in Admiralty Inlet at Restoration Point.

Lieutenant Broughton, in the vessel Chatham, and Mr. Whidby, in a boat, both sailed from there on the 28th of May, 1792,* and entered Possession sound on the same day. Broughton, in the Chatham, surveyed the eastern side of the entrance and Gedney's island,† and Whidby, in his launch, explored as well Port Susan, which he thought to be closed, as Port Gardner and Penn's cove, and he proceeded as far north as Deception Passage, which he believed to be not navigable for vessels of any burden, in consequence of the rocks and overfalls, and of a very irregular and disagreeable tide.‡

He returned from there to the south to the entrance of Possession sound, where he found Broughton, in the Chatham, and also Vancouver, in the Discovery, who, in the meanwhile, had followed his officers.

On this the whole exploring expedition left Possession sound on the 5th of June, and leaving Admiralty sound sailed to other regions.

The movements of Wilkes, in 1841, were similar to those of Vancouver. He sent his second ship, the Porpoise, under Lieutenant Ringgold, to Possession sound. Ringgold surveyed the same ground which had been explored by Broughton and Whidby, and completed, in some respects, their discoveries.

In later years these waters have been explored by the Hudson Bay Company, and by the officers of the United States Coast Survey.

The several parts of which they are composed are the following:

Possession sound proper runs up from Admiralty sound to the north, and conducts to the interior parts of these waters. It is at first only two miles broad, but ends in a basin which is nearly five miles in width. In the midst of the northern part lies a little island, Gedney's island, and towards the east the sound has a prolongation into which the river Snoqualmoo empties. Possession sound may be said to terminate in the north at Point Allan, where it separates into two other branches. The sound received its name by Vancouver, from the circumstance that he, on the 4th of June, the anniversary of the King of England's birth, here took formal possession of all the regions around De Fuca strait and Admiralty Inlet, and distributed, at the same time, different geographical names.§

Gedney's island is a small island, five miles in circumference, in the centre of the northern part of Possession sound proper. It was left nameless by Vancouver, and Wilkes gave to it the name of one of his friends, Mr. Gedney.‖

Port Susan is a long basin which branches out from the eastern part of Possession sound to the north-northwest. It is about ten miles long, and from three to four miles broad. It has a depth of from forty to fifty fathoms in mid-channel, which, however, decreases in the northern part. It was first explored by Whidby, Broughton, and Vancouver, thought to be perfectly closed, and called Port Susan.¶

Wilkes represents it in his charts as closed. In later years only that channel has been discovered which conducts out from it to the north, into the waters north of Caamano island.

* Vancouver, vol. I, pp. 267 and 275. † Idem, p. 280. ‡ Idem, vol. I, p. 287.

§ Vancouver, vol. I, p. 289. He does not exactly state the locality of this ceremony.

‖ Verbal information.

¶ Vancouver, vol. I, p. 289, does not say why he called it so.

On the eastern shore of the port, near its southern entrance, lies the broad mouth of a little river called Snohomish river.

Caamano island is an island fifteen miles long from north to south, with a broad northern head and a very narrow southern extremity, between Port Gardner and Port Susan. Though Wilkes represented this island in his charts as connected with the continent, still he must have had some suspicion about its insular character, for he called it McDonough's island, after Mr. McDonough, United States navy, who commanded, 1812, in Lake Champlain, and gained there a victory over the English.

On the English Admiralty charts, the island is called Caamano island, probably in remembrance of the Spanish name, Bocas de Caamano, given by Elisa to Admiralty Entrance.

This name seems to have prevailed and to have been adopted in all our modern charts, probably because the British officers have essentially proved the insularity of the country.

Point Allan is the southern extremity of Caamano island. It is the only point of the island to which Vancouver gave a name. He called it so, probably, after one of the lords of the admiralty, the Vice-Admiral Sir Allan Gardner.

Port Gardner is the principal channel branching from Possession sound proper towards the northwest. It is about twenty nautical miles long, and two to three miles broad, between Whidby's island on the west and Caamano island on the east. It was called by Vancouver Port Gardner in compliment to the Vice-Admiral Sir Allan Gardner, under the command of whom Vancouver formerly served.

Wilkes, in 1841, called it Saratoga Passage, after the Saratoga, which Mr. McDonough, United States navy, commanded, 1812, on Lake Champlain.

But it appears that on our maps the old name of the first English discoverer prevails over the new one.

From the southwestern part of this bay, a long narrow inlet runs out to the south, cutting into Whidby's island.

To this inlet Wilkes gave the name Holmes's bay, a surgeon of the Porpoise, who died when the chart was constructing.*

Another little bay of this port was called by Wilkes Duncan's bay, after Mr. Duncan, an officer of the ship Saratoga, commanded by McDonough, in honor of whom the neighboring island and the whole passage was called.

Penn's cove is a spacious bay to the northeast of Port Gardner, re-entering into Whidby's island. It was first surveyed by Vancouver's officer, Mr. Whidby, and Vancouver gave to it the name in honor of a particular friend of his, Mr. Penn.† It was again surveyed (1841) by Wilkes, who named different points in it Middle Point, Point Williams, &c.

Deception Passage is a narrow and intricate channel by which the waters of Possession sound and Port Gardner communicate towards the northwest with De Fuca and Rosario straits. It is three miles long from east to west, and in parts only some one hundred yards broad between Fidalgo and Whidby islands. It abounds with rock above and beneath the surface of the water. Before its western mouth lies a little island called Deception island.

The entrance to this passage was first seen from the western side from De Fuca strait by the Spanish explorers, Quimper and Elisa, and called by them Boca de Flon. They, however, did not enter it. It was first explored and recognized as a passage by Vancouver's officer,

* Verbal information.

† Vancouver, vol. I, page 287.

Whidby. He thought it to be impassable for large vessels, and probably from this circumstance Vancouver called it Deception Passage. But Mr. Ringgold, in the ship Porpoise, 1841, sailed through it, and proved it to be also passable for large vessels. There exists still, besides Deception Passage, another water branch leading out from the interior waters of Port Gardner and Possession sound, and connecting them with northern waters, Padilla and Bellingham bays. This passage, nameless on our charts, is long, very tortuous, very narrow, and so extremely shallow that it can only be used at high tide by boats. It separates, to a certain degree, Fidalgo island from the continent. Lieutenant Ringgold discovered and explored this passage, which the Indians had pointed out to him.*

GENERAL VIEW OF THE DE HARO ARCHIPELAGO AND APPROACHES, BETWEEN 48° 26′ AND 48° 46′ NORTH LATITUDE, AND 122° 45′ AND 123° 14′ WEST LONGITUDE.

Between the southeastern part of Vancouver's island on the west and the continental part of Washington Territory on the east lie numerous large and small islands which separate the eastern part of De Fuca strait from the southern part of the Gulf of Georgia, several straits and passages cut through these islands from the south to the north connecting the two great waters.

The two broadest, most navigable, and important of these straits are the Canal de Haro on the west and the Rosario strait on the east.

The principal direction of De Haro Canal is at first from De Fuca strait toward the N.NW.; then it turns in a semicircle to the NE. and E. Rosario strait, *vice versa*, runs at first N.NE., then N., and at last it turns to the NW., describing a semicircle, and mixing its waters with those of De Haro strait in the southern part of the Gulf of Georgia.

So these straits may be said to describe a circle, and to enclose between them a group of islands, which, upon the whole, constitute a circular archipelago. The greater number of these islands, and the largest of them, lie together in a somewhat compact group, but some of the smaller are detached from the main group. For the group itself we will adopt the name San Juan, or De Haro archipelago, the propriety of which name we will consider hereafter.

The three principal parts of this whole locality we will consider in the following order, from west to east: 1. Canal De Haro; 2. The central group of islands; 3. Rosario strait.

The Canal De Haro is a very broad and deep strait leading from De Fuca strait to the Gulf of Georgia. It begins to branch off at Gonzale Point, the southeast extremity of Vancouver's Island, at first in a N.NW. direction, and then describes a circuit to the east, with a length of about thirty miles, and an average width of seven to eight miles.

In its southern part it has about the depth of De Fuca strait, from 60 to 100 and more fathoms, but in its northeastern half it shows the more moderate soundings of the southern part of the Gulf of Georgia, 30 to 40 fathoms, though occasionally here also very great depths occur.†

It is said that throughout the whole strait only one unseen and hidden danger exists, namely, a sunken rock, called Unit Rock, east of Darcy island, in 48° 34′ north latitude.

The currents throughout the whole strait are very strong.

On the western side lie Vancouver's island and many smaller islands and peninsulas, between which the strait branches out into several harbors, bays, inlets, and long passages, which, however, belong to the British dominions.

The largest of the islands above mentioned is Saturna island, on the northwest, and the

* Wilkes's E. E., vol. IV, page 482.

†See reconnoissance of Canal De Haro and Strait of Rosario, Coast Survey Report of 1854.

longest of those passages is that which branches out south and west of Saturna island, from the interior angle of Canal De Haro, towards the northwest, and forms a very interesting interior navigation along the coasts of Vancouver's island.

On the east the shores of De Haro strait are formed by the great central group of islands, principally by San Juan, Waldron, and Orcas islands.

Meares pretends that his mate, Duffin, whom he sent out into the interior of De Fuca strait, saw this strait, and he gives on his chart a faint indication of it, but it is very improbable that the said Duffin ever saw De Haro Canal. We are certain that the Canal, at its southern entrance, was first seen by Don Gonzalo Lopez de Haro, who explored De Fuca strait in 1789, and who returned home from this strait, which was at once called after him, La Boca de Haro, (the Mouth of Haro.)

It was again seen by Haro's successor, Don Manuel Quimper. (1790,) who says that he saw the strait called La Boca de Haro, stretching out far to the northwest and north, to the end of his horizon, but that he had not time to explore it.*

Don Francisco de Elisa was probably the first who sailed through the strait, (1791.) I cannot make it certain, but I believe that he entered into the Gulf of Georgia by Rosario strait, and returned from it by the Canal de Haro; at least, his chart is the first and oldest which has the principal features of the Canal.†

Vancouver sent out, on the 18th of May, 1792, his lieutenant, Broughton, in the ship Chatham, from Protection island, towards these regions. We cannot say whether Broughton, on this occasion, sailed through the strait, because Vancouver's report on this expedition is not explicit.

He has the principal features of the Canal on his chart, but he may have copied it from a Spanish chart, perhaps from that of Elisa, a copy of which he may have received at Nootka Sound.

This Canal was very much neglected by the old navigators, because they all sailed to the east, and passed through Rosario strait; so did Vancouver, Galiano, and Valdez. Their object was to lookout for a passage to the east, and to fix the continental shores. The geography of this Canal has been much more developed in modern times; but the history of this development belongs to the hydrographical history of Vancouver's island.

THE DE HARO ARCHIPELAGO.

The De Haro archipelago consists principally of three very large, four moderately large, and many smaller islands, which form a pretty compact group of a more or less circular outline, with some scattered islands round it, between Canal de Haro on the west, Rosario strait on the east, De Fuca strait on the south, and the Gulf of Georgia on the north. The whole has a circuit of 60 or 80 nautical miles.

One broad strait, called Washington sound, cuts right through it from De Fuca strait to the Canal de Haro in a N.NW. direction, and sends out from its central parts another principal branch towards Rosario strait in an E.NE. direction. In this manner three detached pieces of land are formed, San Juan island, Orcas island, and Lopez island. The interior straits of this archipelago have, however, much smaller dimensions than those which surround the entire group, De Haro and Rosario straits.

All the islands which compose this archipelago present throughout the same geological

* Quimper's manuscript journal is in the library of the State Department at Washington.

† A most interesting and large Spanish copy of Elisa's chart, made in Mexico, is preserved in the archives of the Topographical Bureau in Washington.

features. Sandstone and conglomerate prevail. On some islands are indications of coal. they have a shallow and poor soil, and are very dry in summer. They are of a moderate elevation, and covered with a thick growth of Oregon pine; other kinds of wood are rare. The highest mountains found on them are about 1,000 feet high, with the only exception of Mount Constitution on Orcas island, which has an altitude of more than 2,000 feet. They all abound in deer, and elk in great numbers are found on Orcas island.

The sea otter appears never to have lived among these islands. Lopez de Haro was the first who saw from a distance this archipelago, when he arrived (1789) at the entrance of the canal named after him; and probably, therefore, the name De Haro archipelago has been proposed. Elisa (1791) was the first who circumnavigated the whole group, entering the Gulf of Georgia by Rosario strait, and returning to De Fuca strait by the De Haro Canal.

Elisa did not enter, however, the intricate and tortuous channels of the group, and, thinking that the whole was one island, he called it Isla de San Juan, (St. John's island.) Under this name we find it on his chart, and also on those of the Sutil and Mexicana, (1802.)

Vancouver first had a view of this archipelago from the high east end of Protection island, (on the 18th of May, 1792,) and recognized from afar that it appeared to be an archipelago of islands of various sizes.*

He sent out on the same day his lieutenant, Broughton, in the Chatham, to explore it,† and from this exploration Broughton returned on the 25th of May. But Vancouver gives us only two words‡ on this interesting expedition, and we are therefore unable to say which way Broughton went and what he explored. Vancouver has, however, on his chart all the principal features of the archipelago, the outline and configurations of its largest islands and channels, which he probably obtained from Broughton's survey and chart. But the whole group, as well as its component parts, are without names.

The sea otter never having been found among these islands, the fur traders took no notice of them, but, passing by them, left them unexplored.

Captain Belcher, in the year 1840, made an accurate survey of these regions.

Wilkes, in the year 1841, fitted out a large boat expedition to complete the survey of this archipelago and of De Haro strait. He set out for this purpose, with seven boats, on the 25th of July, from New Dungeness ; and though he could devote to this labyrinth only a few days, (until the 28th of July,) because he was soon called back to the Columbia river by the bad news of the disaster and shipwreck of his vessel, the Peacock, still, by the strenuous exertions of both officers and men, he finished at least the survey of the Canal de Haro, and of a part of the archipelago.§

Wilkes at first intended to give to this archipelago the name of Navy archipelago in honor of the United States naval officers who surveyed it, and whose names he had given to different islands of the group, but he afterwards decided in favor of the name De Haro archipelago, in honor of the first discoverer.‖

The triangulation and other operations of the United States Coast Survey have now been extended over this archipelago. The different islands, straits and harbors of the group we will name from east to west :

* Vancouver, vol. I, page 244.

† Vancouver, vol. I, page 258.

‡ Vancouver, vol. I, page 267.

§ Wilkes's Exploring Expedition, vol. IV, page 484.

‖ Verbal information.

San Juan island is probably the largest of all the islands of this archipelago. It has the form of a half moon, curved towards the southwest to De Haro Canal, and is about twelve miles long from southeast to northwest. In the middle of its southwest shore a mountain rises of about one thousand feet elevation.

It was this part of the archipelago which was first seen and to which the Spanish name San Juan, which comprised the whole, was first attached. It seems, therefore, just that this old name should be retained principally for this island. Wilkes called it Rodgers island, in honor of Commodore Rodgers, for some time the head of the United States navy. Other charts have the name Bellevue island, but the English Admiralty charts preserve the old name San Juan, which is also adopted in the United States Coast Survey charts. To the northwest of it lie several other smaller islands which appear to be a continuation of it.

HENRY ISLAND, which is separated from it only by a narrow channel, with the little islets of PEARL ISLAND and MORSE'S ISLAND. SPIEDEN'S ISLAND, so named by Wilkes after Mr. Spieden, the purser of his ship, Peacock, with the small islet Sentinel R. and Stuart island, so named by Wilkes after Mr. Stuart, his clerk. It has on its northern coast a little bay, which is extremely well protected by another little island before it, and offers an excellent anchorage.

ORCAS ISLAND.—This island is quite as large as San Juan island, if not larger. It is the northern island of the archipelago and has a length from east to west of twelve miles. Its northern shore has the form of a semicircle. Towards the south it runs out into the three broad peninsulas, separated by two inlets. The eastern peninsula has the highest mountain of the whole archipelago, Mount Constitution, (two thousand three hundred and ninety-seven feet high,) so called by Wilkes. Wilkes gave to this island the name of Hull's island, in honor of Commodore Isaac Hull, United States navy, who captured the English vessel Guerriere, in the year 1813–'14. The present name, Orcas island, comes perhaps from Scotland, and is originally to be found on the English Admiralty charts of 1847. Wilkes named the large inlet in the south of the island Guerriere bay, after the above-mentioned vessel, and Ironsides Inlet, after the nickname of the American ship Constitution, which Hull commanded. The name of this ship was given by Wilkes to the above-mentioned Mount Constitution.

The northern headland of this island is called Point Thompson, and the eastern Point Lawrence. The small islands which lie around Orcas island from the east to the north and west are the following: The Three Wasp islets, Jones island, so named by Wilkes after Captain Jones, United States navy, and Flat Top island.

WALDRON ISLAND.—This little island appears distinctly on the old Spanish surveys and on Vancouver's. Wilkes gave to it the name which it bears, after Mr. John Waldron, who was the purser of the ship Vincennes, of the exploring expedition. The northeastern cape of this island is called Point Hammond, and the southwestern Point Dinsey. Skip Tack and Freemann's islands are small islets to the north and east of Waldron.

SUCIA GROUP is a very irregularly shaped island, exactly to the north of Orcas, with half a dozen islets, rocks, and reefs near it. The name is probably of Spanish origin; sucîo means, in Spanish, nasty, dirty, and in the nautical language, foul, unclean. Isla Sucia, means an island with an unclean, dangerous, reefy shore. Wilkes called the island the Percival Group, after Captain Percival, United States navy. The English Admiralty charts have the old Spanish name Sucîa, which seems also to be adopted by the Coast Survey charts.

PATOS ISLAND is a small island to the northwest of Sucia. Its Spanish name, which signifies

Duck island, was changed by Wilkes to Gourd island, and is re-established again by the Admiralty and Coast Survey charts.

MATIA GROUP are two little islands to the east-southeast of Sucia; Wilkes called them the Edmund's Group, but the English Admiralty and Coast Survey charts have Matia Group. Mr. G. Davidson, of the Coast Survey, who surveyed (1853) this little group, the Sucia Group, Patos island, and Waldron island, has materially changed the configuration given to those islands on former surveys; and he has, at the same time, proved the non-existence of the Little Adolpines and Gordon islands, which Wilkes and other charts put to the south of the Percival group.

BARNES'S ISLAND, CLARK'S ISLAND, and the SISTERS, form a little group to the north of Point Lawrence, the easternmost cape of Orcas, and Peapod Knol to the south of it. Lopez island is the third of the great islands of De Haro archipelago.

It is the extreme southeastern island of the group. It has a length of ten miles from north to south, and marks with its southeastern extremity, called Colville Point, the entrance of Rosario strait.

In the history of exploration this point is further memorable, because the officers of the Spanish exploring expedition, of the Sutil and Mexicana, anchored at this point on the 10th of June, and made here an observation of an emersion of the first satellite of Jupiter.*

The name of this island is probably of Spanish origin, and perhaps it is to be derived from the first discoverer of this archipelago, Lopez Gonzales de Haro. Wilkes called it Chauncy's island, after Captain Chauncy, of the U. S. N., but the old name, Lopez, has been restored on the Admiralty and Coast Survey charts. The southeastern part of this island forms nearly an island of itself. From this peninsula a chain of islands runs out directly to the north, connecting Lopez and Orcas, and constituting the western shore of Rosario strait. The first of them on the south is Decatur's island, so called by Wilkes after the celebrated Captain Decatur. Five or six little islets lie around it, among them James island, to the east, towards Rosario strait.

Blakely island is to the north of the former, and was called by Wilkes after Captain Blakely, U. S. N., after whom a little harbor had already been called on Bainbridge island. Between it and Lopez island lies the little Foost island, so named by Wilkes after his friend Mr. Foost.

North of Blakely island, in the channel between it and Orcas, lies Obstruction island.

Shaw's island has a central position in the whole archipelago, and is separated by three channels from the three great islands, Orcas, Lopez, and San Juan. It was named by Wilkes after Captain Shaw, U. S. N. It has no name on the English Admiralty charts of 1847.

The small channels also which separate the islands of the archipelago received names from Wilkes, like those of the islands, commemorating names of officers of the United States navy and of naval events.

For instance, Ontario Roads, the passage along Lopez or Chauncy island to the east, so called because Captain Chauncy had commanded on Lake Ontario.

Frolic strait, between Shaw's and Chauncy islands, after the English vessel the Frolic, captured by Captain Jones.

Macedonian Crescent after an English vessel, the Macedonian.

These names are not all retained on the English Admiralty and Coast Survey charts.

* See, upon this event, the Journal of the Sutil and Mexicana, p. 43.

ROSARIO STRAIT.

Rosario strait is, after Canal de Haro, the longest, broadest, and deepest channel between De Fuca strait and the Gulf of Georgia; but, for discovery and navigation, it has always been the very first and the most used of all the straits, which preference it owes to its geographical position. Vessels which enter De Fuca strait and proceed to the west find some difficulty in sailing round the pointed extremity of Vancouver's island, and turning into the abruptly changing direction of De Haro Canal, whilst Rosario strait, into which De Fuca strait trends by degrees to the northeast and north, receives them easily, and admits them with the same winds with which they sailed through De Fuca strait; for the Rosario strait is the direct prolongation of the navigation of Admiralty Inlet, and vessels which proceed from there to the Gulf of Georgia will naturally prefer the passage through it to the passage through De Haro Canal. Rosario strait has here about the same position and value with respect to De Haro Canal, as, in a similar European archipelago, (that of the Danish islands,) the sound has to the so-called Little and Great Belt.

Rosario strait begins in the south, between Colville Point (east extremity of Lopez island) and Deception Passage, and runs directly north about twenty nautical miles, where it ends between Point Thompson (north extremity of Orcas island) and the northern point of Lummi island. It has throughout a smaller depth than De Haro Canal, generally 30 to 50 fathoms, and at a few places 60.

Its currents are not quite so strong as those of Canal de Haro. Its western shore is formed by the chain of islands named Lopez, Decatur, Blakely, Obstruction, and Orcas. Its eastern shore is formed by another chain of islands. of which we will speak presently. This canal was for the first time passed (1791) by Don Francisco Elisa, and called Canal de Fidalgo, (Fidalgo's Canal,) in honor of a well-known Spanish officer of that time.

Vancouver, who passed it after Elisa, (1792,) gave no particular name to it, either in his report or in his charts. The passage retained the name Canal de Fidalgo on the Spanish Admiralty charts. Wilkes named it Ringgold's channel, in honor of Lieutenant Ringgold, who surveyed it on his passage from Admiralty Inlet to the Gulf of Georgia. On the English Admiralty charts, after Kellet, (1847,) it is called Rosario strait, which name was first given by the Spaniards to the Gulf of Georgia, and is now confined to this small strait. Very probably the name was applied to this strait by the Hudson Bay Company, perhaps by Dr. McLaughlin. It appears now to have been generally adopted.

THE COAST ISLANDS, AND WATERS BETWEEN DECEPTION PASSAGE AND THE BRITISH AMERICAN BOUNDARY LINE, BETWEEN 48° 32′ AND 49° NORTH LATITUDE.

From Deception Passage the general trending of the coast is from S.SE. towards the N.NW. But there are many irregular deviations from this direction, caused by many small and large islands, bays, and peninsulas. Neither the islands nor the coast itself are very elevated, and the elevation diminishes towards the north. Towards the mouth of Fraser's river the country presents a flat, low, and sandy delta.

It is the lowest land connected with the western base of the Cascade range.

This whole section may be subdivided into—

First. The islands and bays along Rosario strait.

Second. The bays and peninsulas along the Gulf of Georgia.

1. Fidalgo island is the first island on the north of Deception Passage. It has Padilla bay on the north and Rosario strait on the west, and on the east it is separated from the continent by that narrow and shallow channel discovered by Ringgold. In its outlines it is somewhat like Orcas and Whidby's islands. On its western part is situated Mount Erie, of an elevation of about 1,250 feet.

Several deep bays cut into it on different sides, and corresponding peninsulas project out from it, which are as yet nameless on our charts.

The Spaniards and Vancouver, who thought it to be a part of the continent, had no particular name for it. Wilkes gave it the name Perry's island, in honor of Commodore Perry, United States navy, the hero of Lake Erie. In allusion to this, also, the highest mountain of the island was named Mount Erie.

On the English Admiralty charts it is called Fidalgo island, probably with the intention of preserving that old name which was given by the Spaniards to what we now call Rosario strait. This latter name appears to have prevailed.

2. Burrow's and Allan islands.—These are two small islands which lie in a bay of Fidalgo island, to the west of it. These two islands are called, in the Voyage of the Sutil and Mexicana, Las dos Islas Morros,* (the two Rock islands.) Burrow's island is the larger, and was called after Captain Burrow, United States navy, who lost his life on board the ship Boxer.†

Allan island was called after Captain Allan, United States navy, who lost his life on board the American ship the Argus. After this ship, the bay itself was named by Wilkes Argus bay. Quite near to these are a few islets and rocks, as Young island, Dun's Rock, and Williamson's Rock.

3. Padilla bay is a pretty large basin, surrounded on the south and east by Fidalgo island and the continental shore, separated on the north from Bellingham bay by the long, sandy peninsula of Wilson Point, and covered on the west by Guemes island. To the south of this island the bay is connected with Rosario strait by a narrow channel, and to the northeast of that island by a broad outlet. In the middle parts of the bay lie several small islets.

The bay probably received its name, Seno de Padilla, from Elisa, (1791.) Padilla was one of the titles of the then reigning viceroy of Mexico, Count Revilla Gigedo y Padilla. Vancouver, through his officer, Whidby, entered the bay, gave no particular name to it, and this was probably the reason why the old Spanish name was continued.

4. Guemes island, (48° 34′ north latitude, 122° 37′ west longitude,) is an island of a triangular shape, to the west of Padilla bay, and separated from Cypress island by Bellingham channel. Some smaller islets lie round it, among them Sack's island, to the northeast. The island received its name from the discoverer, Elisa, probably after the then viceroy of Mexico, Count Revilla Gigedo, whose family name was Guemes. A town had already been founded on the shores of the Gulf of Mexico in 1745, and named, in honor of another viceroy of the same family, Don Juan Francisco Guemes, Count of Revilla Gigedo. There is also a little Port Guemes on the north side of Vancouver's island. Vancouver has no name for this island, and probably from this circumstance the old Spanish name was continued.

Wilkes called the island Lawrence island, in honor of Captain Lawrence, United States navy, who commanded the Hornet, and captured the English vessel Penguin. After this English ship Wilkes called a bay on the east side of the island Penguin bay, and he gave the

* Sutil and Mexicana, p. 45. † Verbal information.

name of the American vessel to the narrow passage which separates Fidalgo island from Guemes island, and which he named Hornet's harbor.

5. Cypress island (48° 36′ north latitude, 122° 43′ west longitude) lies to the west of Guemes, and is of an equal size. Like all these islands, it is pretty well wooded; is composed of high, rocky mountains and steep perpendicular cliffs,* and has, in the centre, Lake Mountain, of 1,525 feet elevation. At a small distance from the north point of the island lies Rock island; to the east the Cone islands; to the west, in a large bay, Strawberry island; and the southern point of Cypress island is surrounded by a number of rocks.

On the Spanish charts I find no name for this island. Broughton saw this island on his preliminary reconnoissance of these regions, and discovered, on its southwestern side, a bay, which he called Strawberry bay. † Vancouver anchored in this bay on the 6th of June, 1792, and adopted that name. The island itself was named by Vancouver Cypress island, from the abundance of Cypress which he found there. ‡ Wilkes called that little islet in Strawberry bay, which Vancouver left nameless, Hautboy island, from that kind of strawberries which is very common in North America, and usually called Hautboy in the United States.§

6. Bellingham channel (48° 35′ north latitude, 122° 40′ west longitude) is a broad passage between Cypress and Guemes islands. It runs to the N.NE., and is the best passage from the southern part of Rosario strait to Bellingham bay in the east.

The Spaniard (Elisa) named it Canal de Guemes, from the island to the south. Its present name is derived from its geographical position with respect to Bellingham bay.

7. Sinclair's bay (38° 37′ north latitude, 122° 41′ west longitude) is a little island to the northeast of Cypress island. It has on the Spanish Admiralty charts (Madrid, 1795) the name Isla de Aguayo. Aguayo was, like Padilla and Guemes, one of the titles of the viceroy of Mexico, Count of Revilla Gigedo. It received its present name from Wilkes.

8. Vendovi island is a still smaller island to the west of Sinclair. It received its name by Wilkes, from the name of an Indian whom Wilkes brought on board his vessel from the Feejee (or Viti) island to these northern quarters. To the N.NW. of Vendovi lie the Viti Rocks, so named in connexion with the former named, from the home of the Indian Vendovi, the Viti islands.§

9. Bellingham bay (48° 40′ north latitude, 122° 33′ west longitude) is the largest and most eastern bay to the east of Rosario straits. It may be considered to be the southeastern extremity of the Gulf of Georgia, and it therefore always attracted, in a high degree, the attention of early navigators, who searched in this bay for a further passage towards the east.

It has an oval shape and a length of about 16 nautical miles from N.NW. to S.SE.; it is for the greater part surrounded by the continental shore, and half closed to the west by the peninsula of William Point on the south, and the peninsula of Point Francis on the north.

Between these two points lie the southern part of Lummi island, Elisa's island, Vendovi island, which further help to close the bay. The bay may be said to have two wings or subdivisions—one to the southwest of Point William, which is, par excellence, called Bellingham bay, and one to the northeast of Point Francis, which has on our charts the name Gaston bay. The bay seems to be the most shallow of all the waters of this region; the deepest soundings at the entrance are from 20 to 30 fathoms, and from there they seem to decrease regularly to the east, south, and north, to 10, 5, 3, and 1 fathom. The shallowness of the bay corresponds

* Vancouver. † Vancouver, vol. I, p 292. ‡ Vancouver, p. 294. § Verbal information.

to the lowness of the country round it, which is partly even swampy and marshy.* Into the north part of the bay empties a pretty large river, and to the east of the bay lies a large interior lagoon.

Elisa (1791) was the first who entered this bay and called it Seno de Gaston, (Gaston's Gulf.†) It was again entered, after him, by Vancouver's officer, Mr. Whidby. In a boat expedition from Birch bay, on June 11, 1792, he surveyed it thoroughly, and Vancouver gave it the name Bellingham bay—he does not say why. The bay was entered again, a day or two after Whidby surveyed it, by the Spanish ships Sutil and Mexicana. They of course continued the Spanish name Bahia de Gaston, and both the English and the Spanish name have now found their place on the charts of the bay after the manner already pointed out.

Point William (48° 36′ north latitude, 122° 33′ west longitude) is the northern extremity of a narrow, long peninsula, which separates Padilla from Bellingham bay. It was first recognized by Elisa, and named by him Punta de Solane. Under this name we find it on all the Spanish charts. On Vancouver's chart it is called Point William, which name has been continued.

10. Point Francis (48° 42′ north latitude, 122° 37′ west longitude) is the southern extremity of a long, low, and narrow peninsula (similar to that of Point William) which projects from the continent to the south and closes Gaston bay. On the Spanish charts I find no name for it.

Vancouver on his charts gives to it the name of Point Francis, which it still bears.

11. Elisa's island is a small island between Points Francis and William. This island has no name, as far as I know, on former charts; Wilkes called it Elisa's island. * * *

12. Lummi island (48° 43′ north latitude, 122° 40′ west longitude) is a narrow island, nine nautical miles long from NW. to SE., which was parallel with Point Francis peninsula, and forms with it Hale's Passage.

It is, like Cypress island, somewhat elevated, and has upon it a mountain called Lummi Peak, of 1,560 feet height.

It was named by the discoverer, Elisa, (1791,) Isla de Pacheco, probably after one of the titles of the Mexican viceroy who sent him. The entire name of this gentleman, the elements of which have been dispersed in the region, was Señor Don Juan Vicente de Guemes Pacheco y Padilla Orcasitees y Aguayo Conde de Revilla Gigedo.

Vancouver has no name for it. Wilkes called it MacLaughlin's island, in honor of Dr. MacLaughlin, the famous and distinguished officer of the Hudson Bay Company, commanding at Fort Vancouver in the year 1841.

An Indian name, Lummi island, probably introduced by the Hudson Bay Company traders, has prevailed over the former.

The Lummis, or Nook Lummis, are an Indian tribe often mentioned in the vicinity of Bellingham bay.‡

13. Hale's Passage (48° 44′ north latitude, 122° 40′ west longitude) divides Lummi island from the peninsula of Point Francis; it was named by the old Spaniard El Canæ de Pacheco, from the neighboring island.§

Wilkes called it Hale's Passage in honor of Mr. Hale, the ethnographer of his exploring expedition. The same name of Hale's Passage was given by Mr. Wilkes to another strait in Puget Sound, between Fox island and the great peninsula.

* "Anegadizon" Galeana.

† I could not find who this Gaston may have been.

‡ See De Harley, in Schoolcraft, vol. V, page 701.

§ See proofs in the Sutil and Mexicana, page 48.

14. De Lara's Gulf, (48° 46′ north latitude, 122° 40′ west longitude.)—North of Lummi island a little bay is formed by the peninsula of Point Francis in the south and Sandy Point in the north.

This bay was called by the Spaniard (Elisa) Enseñada de Lara, (Lara's Inlet.)*

The bay has no name either on Vancouver's chart or on those of Wilkes or Kellet. It would therefore be appropriate to restore on our charts one of the old Spanish names, which have too often been neglected, and call the inlet De Lara's bay.

De Lara's bay is the last bay at the northeastern end of Rosario strait, and we now enter the broad waters of the Gulf of Georgia.

15. The Gulf of Georgia, (from 48° 46′ to 50° north latitude, and from 122° 40′ to 124° 50′ west longitude.)

The Gulf of Georgia is a great interior basin between Vancouver's island and the continent of America. It is one hundred and twenty nautical miles in length from SE. to NW., and thirty miles in width. From the middle of the strait it becomes narrow towards the ends. On the south it is connected by numerous passages with De Fuca strait, and on the north its waters are continued through Johnstone's and Queen Charlotte's straits to the Pacific ocean. Its southwestern shore (Vancouver's island) is partly broken up by smaller islands, harbors, and inlets. But along its northeastern shore (continental coast) are found much larger and deeper inlets, similar to Admiralty Inlet.

This gulf appears to be not quite as deep as De Fuca strait, particularly in its southern part, where a great river, Fraser's river, enters, and where the soundings only occasionally exceed thirty fathoms.

Neither Cook nor the early Spanish and French navigators, Perez, Bodega, La Perouse, &c., who saw Vancouver's island on the Pacific side, suspected the existence of this gulf—they supposed Vancouver's island to be a part of the continent.

After the year 1789 De Fuca sound was entered, and, at the same time, on the north, Cape Scott was recognized, and the inlets near Queen Charlotte sound were entered. So we see in the charts of Meares and Dixon (1790) Vancouver's island represented as a peninsula.

The Indians of Nootka sound had already often reported a large sheet of water behind the island, but were probably not always well understood. In the years 1789 and 1790 De Haro and Quimper looked into the passages which come out from the Gulf of Georgia to the south toward De Fuca strait; and in the year 1791 Elisa entered through one of these passages into the broad Gulf of Georgia, which he explored as far north on the eastern side as our present Howe's sound, from where he saw the waters stretched out to the northwest. He named all these interior waters Canal de nuestra Senora del Rosario, (the channel of our Lady of the Rosary,) I do not however know why. It cannot, however, have been in honor of the so-called Festival of the Rosary, (Fiesta del S. Rosario,) because this falls on the 2d of October, and Elisa was obliged to give up further progress on the 7th August, on account of scurvy and sickness among his crew.† Vancouver, not acquainted with Elisa's name and discoveries, gave to it the name of Gulf of Georgia, from the part of the continent to the east of it which he had named New Georgia, in honor of King George III. From the manner in which Vancouver expresses himself about this name in his report, and also from the manner in which he places this name on his chart, it appears that he included under it also the eastern or interior part of

* See the proofs for this in the Sutil and Mexicana, page 48.

† Sutil and Mexicana, p. 2.

De Fuca strait, and likewise all the straits of the Archipelago of De Haro. His name runs over all these interior waters.

On the Spanish charts the name Rosario Canal was for a long time retained, and though it had an older date and better claim than that of Vancouver, yet it at last yielded to Vancouver the more powerful authority, and is now confined to that little strait east of De Haro Archipelago. Vancouver's name, Gulf of Georgia, has, however, also been thrown out of De Fuca strait and confined to the waters north of De Haro Archipelago.

Some American authors seem to have endeavored to allow De Fuca strait to encroach upon the Gulf of Georgia. Mr. Greenough, for instance, has quite expunged the name Gulf of Georgia from his chart, and makes the name De Fuca strait run round the whole of Vancouver's island.

16. Birch bay (48° 54′ north latitude, 122° 46′ west longitude) is a small cove north of the southeastern entrance to the Gulf of Georgia. The southeast part of the bay is formed by nearly perpendicular rocky cliffs, while the land to the east is low.

This bay was probably already seen by Elisa and named by him Enseñada de Garzon. A mere comparison of the Spanish charts of the officers of the Sutil and Mexicana with our modern charts might leave still a doubt whether the Spanish Enseñada de Garzon is our Birch bay.

But the circumstances which the said officers relate, that on passing the mouth of Enseñada de Garzon, on the evening of June 12, 1792, they then discovered the lights, and saw the two ships of Vancouver at anchor,* makes the indentity of that bay with Birch bay, where Vancouver's vessels were then stationed, quite certain.

It was visited and surveyed again by Vancouver, (June, 1792,) who then made it one of his principal stations, from which he explored the vicinity by boat excursions. He called it Birch bay, because he found birch trees there in abundance.† This name is retained by modern navigators, Kellet, Wilkes, &c.

The southern entrance cape of Birch bay is called Point Whitehorn.

17. Peninsula of Roberts's Point, (49° north latitude, 123° 4′ west longitude.) Birch bay is the last useful, well protected, easily accessible, and deep bay, with good anchoring ground, before reaching the 49th parallel. After this the waters towards the north become very shallow and filled with sand banks, which may be considered as a product of Fraser's river. From the low delta of this river a low, sandy and narrow peninsula runs out and projects towards the south. It includes, to the east, with the equally low coast of the continent, a pretty large bay of about 25 miles in circumference.

This bay, which has to the east two little coves, is throughout very shallow, and in its northern part filled with sand banks; the boundary parallel, of 49° north latitude, cuts right through the middle of this bay, and the southern half only belongs, therefore, to our domain. Neither the bay nor its coves have any name in the British Admiralty charts. They have here only the word shallow. On the old Spanish Admiralty charts, (Madrid, 1795.) it is called Enseñada del Engano, (Deception Gulf.) probably in allusion to its shallowness. The Spaniards had also a name for the low point or peninsula which, in latitude 49° 2′, sets out into this bay from the continent. They call it Punta de San Rafael, (San Rafael Point.) If we have no local names, then we ought to restore the old Spanish names.

* Sutil and Mexicana, page 48.

† Vancouver, volume I, page 315

The southern part of the Point Roberts peninsula is a part of the continent which falls still south of the 49° north latitude. The low peninsula of this point rises in this southern part to high, white, sandy cliffs falling perpendicularly into the sea.

This point and peninsula were first discovered by Elisa, and named by him Punta de Cesseda and Peninsula de Cesseda. Vancouver gave to the point its present name, Point Roberts, after Captain Henry Roberts, one of the most distinguished officers who had accompanied Cook with Vancouver.

18. Fraser's river.—Though the two principal mouths of Fraser's river fall north of the 49° north latitude and beyond the limits of our domain, still, at least, some sand banks and other products and influences of this river, which may be called a part of the delta, are still included in our boundaries, and we may, therefore, make a few remarks upon the nature and history of this boundary river. We can, however, touch the subject but slightly.

Fraser's river is, after the Columbia, the largest and most important river of the northwest coast of America. It rises in the Rocky mountains, near 54° north latitude, flows first directly south, and then turns abruptly to the west, in about latitude 20°, breaks through the Cascade mountains about Mount Baker, and empties into the Gulf of Georgia by two principal branches, a few miles north of 49° north latitude, the boundary line of the United States. The river forms there a broad and large delta, which consists of a tract of low, partly swampy, sometimes widely inundated, land. This delta projects into the gulf, like a peninsula, between the two points, Point Roberts (Punta de Cesseda) and Point Grey (Punta Langara.) Between these two points the river has formed broad sand banks and mud flats, which were called by Vancouver the Sturgeon Bank, and which are now sometimes called, from Point Roberts, the Roberts Banks. This sand bank is from eight to ten miles broad, and its soundings increase, in the direction from east to west, from one to ten fathoms, with which depth it may be said to disappear.

Probably Elisa (1791) had the first suspicion of the existence of a river in this region, which manifests itself very perceptibly even very far out into the gulf by the low delta, by its sand banks, by irregular currents, by large trees and logs carried out into the sea; and further, also, by that deep cut or valley in the Cascade range which plainly appears as a deep depression from the water.*

That Elisa must have concluded, from all this, upon the existence of a river, is evident from Vancouver, who says that, when he was coming from his boat excursion and survey of these shores back to the south, he met the officers of the Spanish expedition, Galiano and Valdes; they expressed themselves astonished to hear that he had not found a river said to exist in the region which he had just explored, and named by one of the Spanish officers Rio Blancho, in compliment to the then prime minister of Spain.† That Spanish officer who named the said river, and of whom Galiano and Valdes had this report, could have been none other than Elisa, because he was the only Spaniard who before them had ever been so far.

Vancouver was wrong only in understanding the river named Rio Blancho. He heard probably Rio de Florida Blanca, for the Count Florida Blanca was then the prime minister of Spain.

Vancouver, who sailed along the low delta of this river, (June 13, 1792,) was unable to approach the shore from the shallowness of the water. He called the bank Sturgeon Bank, and circumnavigated it without suspecting or discovering a river.

* The observation of this depression is mentioned in the account of the Sutil and Mexicana.

† Vancouver, vol. I, page 314.

Valdes and Galiano, who were at the same time with Vancouver in this locality, (June, 1792,) discovered here, also, the sand banks near the mouth of the river, experienced the current of the river, saw great trunks carried away by these currents, tasted sweet water, and observed, from far in the snowy mountains, a deep, broad cut or valley, (una quebrada ancha,) the valley of Fraser's river ; and they, from all this, concluded that there must be a great river in the neighborhood. They supposed it to empty into the salt water canal which Elisa had called Canal de Florida Blanca, (Vancouver's Burrard's canal.) But they searched for it in vain in this canal, and the river remained undiscovered also by them.*

The same river was, a year after Vancouver, (June, 1793,) discovered and navigated in its upper parts by Alexander MacKinzie, who introduced for it the Indian name Facoutche Fessee, (said to signify great river.) After this it was supposed to be a branch of Columbia river. After the year 1806, Mr. Harmon, of the Northwest Company, explored many upper branches of this river.

In the year 1812 another agent of the Northwest Company, Mr. Fraser, reached it again from the interior, traced it very far down, and made it nearly certain that it was not a part of the Columbia river, but that it entered into the Gulf of Georgia. Since that time the river has been called Fraser's river.

The first European who passed down the whole river from its head to its mouth, and who observed more accurately the longitudes, latitudes, and turning of its course, was Sir George Simpson, governor of the Hudson Bay Company's territories, in the year 1828.

19. MOUNT BAKER (48° 40′ north latitude, 44° 40′ west longitude) is one of the loftiest and most conspicuous peaks of the northern Cascade range; it is nearly as high as Mount Rainier, and, like that mountain, its snow-covered pyramid has the form of a sugar-loaf. (See sketch.) It is visible from all the waters and islands which we have just described, and from the whole southeastern part of the Gulf of Georgia, and likewise from the eastern division of the Strait of De Fuca. It is for this region a natural and important landmark, as Mount Rainier is for Admiralty Inlet.

The Spaniards, Quimper and Elisa, (1791,) were probably the first discoverers of this mountain, and called it La Montaña del Carmelo. This may be concluded from the circumstance that the historian of the expedition of the Sutil and Mexicana (1792) uses the name as an already old and known appellation.† It seems, however, that this name was not given exclusively to this peak, but to the whole snowy range between Mount Baker and Mount Rainier.

On the expedition of Vancouver, Lieutenant Joseph Baker, of the ship Discovery, discovered this mountain for the first time in the afternoon of the 30th of April, 1792, at the ship station near Fort Discovery, from which point it bore north 43° east. Vancouver called it after him, Mount Baker, which name it has always retained. Mount Baker, which stands quite near the 49th degree of north latitude, may be said to be the northwestern boundary pillar of the territory of the United States, and with it we conclude this review.

* See account of the voyage of the Sutil and Mexicana, page 64.

† For instance, on page 47 of the Sutil and Mexicana.

Stanley. Del

Sarony, Major & Knapp Lith. 449 Broadway, N.Y.

M^T BAKER & CASCADE RANGE, FROM WHITBYS ISLAND.

CHAPTER XVI.

METEOROLOGY.

COLD AS AN OBSTRUCTION TO THE RAILROAD ROUTE.—SNOW AS AN OBSTRUCTION TO THE RAILROAD ROUTE.—OBSERVATIONS ON THE ISOTHERMAL CHART.—TABLE OF MEAN TEMPERATURES AT STATIONS BETWEEN THE MOUTH OF THE ST. LAWRENCE AND PUGET SOUND.—COMPARISON OF NEBRASKA WITH REGIONS HAVING A SIMILAR CLIMATE IN EUROPE.—CLIMATE OF WASHINGTON TERRITORY.—GENERAL CONCLUSIONS.

COLD AS AN OBSTRUCTION TO THE RAILROAD ROUTE.

It is alleged that the weather is so cold on this route that it will be impracticable to work men in the construction of the road for a large portion of the year, and that it will be impracticable to run cars for many days in the winter.

But we have very complete observations on these points, and great lines of railroad in operation over tracts of country as cold and even colder than the route from Fort Benton to the shores of the Pacific. The following table gives the mean temperatures of the winter of 1853–'54, at stations on the route of the expedition, with comparisons of the same winter, and of the average of many winters on railroad lines in Canada, the United States, and the great Russian line between St. Petersburg and Moscow. It shows also that the coldest part of the route is, in reality, that between the Great Bend of the Missouri and the Mississippi, where the cold is not more severe than at Quebec or Moscow:

Comparison of mean winter temperatures.

Localities.	1853–'54.	Average.	Length of observation and remarks.
	°	°	
Cantonment Stevens	24.9	....	
Fort Benton	25.4	....	
Fort Owen	....	30.3	Winter of 1854–'55.
Fort Snelling	11.6	16.1	Mean of 35 years.
Fort Garry	....	3.9	Winter of 1855–'56.
Montreal	13.2	17.8	Mean of 10 years.
Quebec	11.0	13.3	Mean of 10 years.
Moscow	....	15.2	Mean of 21 years.
St. Petersburg	....	18.1	Mean of 25 years.
Edmonton	....	....	1827. January, 11°.1; February, 14°.3
Albany	24.3	26.0	Mean of 28 years.
Salt Lake City	32.1	32.7	Mean of 2 years.
Fort Laramie	30.9	31.1	Mean of 6 years.
Fort Kearney	26.0	23.0	Mean of 6 years.
Boston	26.2	28.4	Mean of 36 years.
Milwaukie	21.6	26.0	Mean of 3 years.
Buffalo	26.7	26.0	Mean of 3 years.
Fort Pierre	....	15.9	3 winters—in 1854–'55, 24°.6; in 1856–'57, 9°.9.
Fort Clark	....	13.2	1833–'34.

Thus, in the winter of 1853–'54, an unusually cold one throughout the northern States and Territories, the climate at Fort Benton was 12° warmer than at Montreal, 14° warmer than at Quebec or Fort Snelling, 10° warmer than at Moscow, and 7° warmer than at St. Petersburg. In the Bitter Root valley the difference was —0°.5 less, but in the following winter 4.°9 greater, which is no doubt nearer the mean winter climate.

Comparing now the greatest cold observed, we find that in January, 1854, the coldest days at Fort Benton and Cantonment Stevens were from 6° to 8° milder than at Fort Snelling or Montreal, and the same fact would be undoubtedly true of the great Russian route, although records are not attainable, and from the great distance of the places might not be comparable for the same winters.

Comparison of greatest cold observed.

Locality.	1854.		Other years.	
	Date.	Extreme cold.	Date.	Extreme cold.
		°		°
Cantonment Stevens	January 19.	—29		
Fort Owen			February 20, 1855	+1.50
Fort Benton	January 14.	—27		
Salt Lake City	January 24.	—14		
Fort Laramie	January 20	—21		
Fort Kearney	January 20	—16		
Fort Snelling	January 21	—36		
Fort Garry			December 24, 1855	—48
Montreal	January 29	—34	1822	—36
Quebec	January 29	—29		
Albany		—10	January, 1840	—23
Boston	January 29	— 6	February 7, 1855	—16
Edmonton			January, 1827	—27

Considering the subject now in another point of view, I take the number of cold days when the average temperature was below zero. It thus appears that there were more such days on the Grand Trunk line and the railroad lines in Minnesota than in the Rocky mountains.

Number of winter days when the thermometer averaged below zero.

Locality.	1853–'54.	Other winters and remarks.
Cantonment Stevens	10	January.
Fort Owen		None in 1854–'55.
Fort Benton	12	January.
Salt Lake City	2	January 20 and 21.
Fort Laramie		
Fort Kearney	4	January.
Fort Snelling	18	
Fort Garry		53 days in 1855–'56.
Montreal	18	
Quebec	23	
Albany		
Boston		February 6, 1855,—7°.7.

The next table, showing the number of cold days during three winter months, when the thermometer averaged above the freezing point, is still more favorable, showing that the number was even greater at Cantonment Stevens than at Albany or Boston, while far more than at the Canadian stations.

Number of days in three winter months when the thermometer averaged above 32°.

Locality.	1853–'54.	Other winters and remarks.
Cantonment Stevens	32	
Fort Owen		46 in 1854–'55.
Fort Benton	43	
Salt Lake City	34	
Fort Laramie	51	
Fort Kearney	47	
Fort Snelling	6	
Fort Garry		None in 1855–'56.
Montreal	8	
Quebec	5	
Albany	18	
Boston	31	

But it may be objected that the temperature of Fort Benton and Cantonment Stevens is not the measure of the temperature of the intermediate rocky range through which the route passes, and which is much more elevated. Fortunately, the party of Lieutenant Grover made observations of temperature on the route, and it has been found by careful comparisons that the party made the passage during the extreme cold weather of that winter, so that the temperature then observed gives the extreme cold of the pass, and not the usual cold. A very intelligent young man who accompanied Lieutenant Grover to Fort Benton returned immediately, and found the weather very mild and pleasant in the pass, corresponding to the observed temperatures at Fort Benton and Cantonment Stevens.

The following tables show the temperatures as observed by Lieutenant Grover in the pass, and at the stations on each side of it, during eleven of the coldest days in January, 1854, with a comparison of these with the corresponding coldest days at other points.

Comparison of the eleven coldest days of January, 1854, at the following places:

Date.	Cadotte's Pass.	Cant. Stevens.	Fort Benton.	Fort Kearney.	Fort Snelling.	Montreal.	Quebec.
	Sunrise, noon, and sunset.	Lat. 46° 30′; 7 and 9 a. m., 2 and 7 p. m.	Lat. 47° 20′; 7 a. m., 2 and 9 p. m.	7 a. m., 2 and 9 p. m.	Lat. 45°; 7 a. m., 2 and 9 p. m.		
	°	°	°	°	°	°	°
January 12	−18	+21.3	−10.3	+ 7.0	.....	.....	.....
13	−22	+ 5.7	−13.3	+ 9.0	.....	.....	.....
14	−19	− 4.3	−18	− 1.0	− 4.0	.....	.....
15	−18	− 7.3	− 8.3	+ 0.5	− 1.5	.....	.....
16	−20	− 8	0	+ 7.0	−12.0	.....	.....
17	− 0.3	− 5.3	− 5	+ 8.5	− 6.0	.....	.....
18	− 9	− 1.5	−15	+ 1.0	+ 2.0	.....	.....
19	−13	−16	−18	−11.0	−10.2	+ 5.6	+ 3.5
20	−10	− 7.8	+ 5.3	+ 4.5	+ 2.0	+10.5	+ 7.8
21	+ 6	+ 7.5	−10.7	− 3.5	−23.5	+11.3	+13.3
22	+ 4	.....	+12.7	+10.5	−24.5	− 6.9	−12.0
23	.....	.....	.....	.....	− 9.0	− 3.1	− 5.5
24	.....	.....	.....	.....	−18.0	+ 2.2	− 8.9
25	.....	.....	.....	.....	.....	+ 0.6	−13.2
26	.....	.....	.....	.....	.....	+ 7.1	+ 2.5
27	.....	.....	.....	.....	.....	−11.0	+ 7.0
28	.....	.....	.....	.....	.....	−19.1	−11.4
29	.....	.....	.....	.....	.....	− 0.9	−16.1
Mean	−10.9	− 1.6	− 7.3	+ 2.9	− 9.5	− 0.3	− 3.0

13th to 24th.—Pembina.................... −17.7 | 16th to 25th.—Rochester.................. +21.8

Comparison of ten days preceding these on eastern slope of Rocky mountains with similar periods at other places.

Date.	E. of mountains.	Cant. Stevens.	Fort Benton.	Fort Kearney.	Fort Snelling.	Montreal.	Quebec.
	°	°	°	°	°	°	°
January 2	+51.5	.....	+51.7	+46	.....	.....	.....
3	+12.6	+34	+11.3	+40	.....	.....	.....
4	−12.6	− 0.8	−10.7	+18	+ 3.0	.....	.....
5	− 3.3	− 8.2	0.0	− 2.5	− 6.0	.....	.....
6	+19.0	.....	+18.0	+ 3.5	− 6.0	.....	.....
7	+31.6	.....	+34.3	+16.5	+ 1.0	.....	.....
8	+44.3	+33	+46.7	+31.5	+ 2.0	.....	.....
9	+30.3	+37.7	+43.7	+31.5	+21.6	− 8.5	− 9.6
10	+26.6	.....	+37.7	+34	+19.0	− 4.2	− 7.1
11	+32.0	.....	+28.3	+26.5	+13	+10.5	+13.3
12	.....	.....	.....	.....	−18.5	+36.8	+26.1
13	.....	.....	.....	.....	+ 2.0	+35.4	+35.2
14	.....	.....	.....	.....	.....	+13.9	+18.1
15	.....	.....	.....	.....	.....	+ 3.7	+ 3.1
16	.....	.....	.....	.....	.....	+14.5	+ 8.7
17	.....	.....	.....	.....	.....	+ 3.0	+16.5
18	.....	.....	.....	.....	.....	+ 3.6	+ 3.5
Mean	+23.2	.....	+26.1	+24.6	+ 3.0	+10.9	+10.8

3d to 12th.—Pembina; lat. 49°.... +5.0 | 4th to 16th.—Rochester............ +30.4 | 4th to 13th.—Madison, Wis..... +17.5

From these data a good estimate may by formed of the temperatures of the mountain passes between each set of posts of observation, by allowing 3° decrease of temperature for each 1,000 feet elevation, as estimated by Professor Henry, of the Smithsonian Institution. From this calculation the following table is constructed:

Fort Benton.	Distance to—	Cadotte's Pass.	Distance to—	Bitter Root valley.	Comparison on route by Cadotte's and South Passes.	Fort Laramie.	Distance to—	Bear River mountains.	Distance to—	Fort Hall, winter 1849 and 1850.
Feet.	*Miles.*	*Feet.*	*Miles.*	*Feet.*		*Feet.*	*Miles.*	*Feet.*	*Miles*	*Feet.*
2,780	95	6,044	95	3,284	Altitude	4,519	330	8,000	95	4,500
°		°		°		°		°		°
25.0	......	17.0	......	27.0	Winter temperatures of 1853 and 1854	30.2	......	15.1	......	23.0

In the latter case the interval between the two posts, which exceeds 6,000 feet in altitude, is over two hundred miles, all of which would have a winter temperature ranging between 15°.1 and 23°.5.

On the other hand, only 165 miles on the northern route exceed 3,000 feet in altitude, having a winter temperature between 17°.0 and 26°.0, and only six miles exceed 5,000 feet.

The two coldest days in January, 1854, furnish a good evidence of the general correctness of the rule followed, as here shown:

Date.	CADOTTE'S PASS.	FORT BENTON.	Difference.	Wind.
	Sunrise, noon, and sunset.	7 a. m., 2 and 9 p. m.		
	°	°	°	
January 12, 1854	—18	—10.3	7.7	NE.NW.
January 13, 1854	—22	—13.3	8.7	NE.

SNOW AS AN OBSTRUCTION TO THE RAILROAD ROUTE.

Details of the information in regard to snows in the Cascade mountains are given in Volume I, and more recent observations do not show any probability of their being under-estimated. The great mildness of the winters must affect the temperature of the passes sufficiently to prevent the constant accumulation of snow for more than one winter month, while rains frequently take their place. Compared with Steilacoom, where the mean winter temperature is 39°.5, that of Snoqualmoo Pass should be at least 29°, while for much of the time it would rise above the freezing point and cause thaws or rain. It has already been shown that the difference of 3° for each 1,000 feet was too great, as determined by actual observation of the coldest days of January, 1854, at Fort Benton and Cadotte's Pass; and the great rarity of cold northeast winds, as we approach the Pacific coast, must make the difference there still less than in the Rocky

mountains. The difference which would be expected from this rate of decrease of temperature is 9°.3, showing that, even when the wind blew from the coldest quarter, less cold was produced than is usual in places having the same relative altitude above the sea. And as the westerly winds are most prevalent, the difference between the climate of the pass and Bitter Root valley must usually be even much less.

It has been found that some snow usually exists in the Nachess Pass from November to May; but that being 1,424 feet higher than the Snoqualmoo, a month may safely be allowed as the difference in the Snoqualmoo Pass, while the period during which more than five feet lies in the highest part of it (ten miles, over 2,000 feet) may be reduced to a month.

In calculating the probable amount of snow which fell in the Snoqualmoo Pass in the winter of 1853–'54, the mean temperature of that winter should be used instead of the mean of four winters, since there is a marked difference between them—that of 1853–'54 being 1°.2 colder than the average, and 4°.4 colder than two winters out of six since 1849, and only 1°.2 warmer than the coldest.

Using the recorded temperature at Fort Steilacoom for 1853–'54, we find that of November, 1853, was only 0°.5 higher than that of December; therefore, if snow fell in December it must also have fallen in November. And in this month there was 18.41 inches of rain at Steilacoom, while only 20.68 fell in the three following months. This would give for three months preceding Mr. Tinkham's journey across the pass in January 26.15, (adding November to Captain Humphrey's estimate,) and 12.96 afterwards. By the rule of allowing twelve times the bulk of the rain for snow, Mr. Tinkham should have found twenty-six feet, whereas he found only six; showing that either 7.2 inches only of moisture had fallen, or that most of it (over three-fourths) fell as rain. Admitting that the whole which fell after his crossing was in the form of snow, there would be 12.96 feet more; but this would be absurd, since February was nearly 10° warmer than January, and there was 1.12 less rain at Steilacoom; taking the same proportion as for the preceding months, viz: $\frac{3}{13}$, making three feet to be added—in all, nine feet for the winter. But as the temperature of March was 0°.7 colder than December, we must admit that three-thirteenths of the moisture of that month was also deposited as snow; and then 2.89 inches of rain at Steilacoom would give us + .66 feet more of snow to be added, making 9.66 feet from November 1 to April 1.

If November is omitted, so must be December; and then the moisture which fell before the 21st of January at Steilacoom, 3.32 inches × 12, would give 3.32 feet of snow, while Mr. Tinkham found six feet. Therefore, November and December must be included. Besides, Lieutenant Mowry states that snow falls in these mountains in November, and Lieutenant Hodges actually met with a slight fall in the Nachess Pass in September.

Here we see, too, the necessity of taking into the account the loss by evaporation, thawing, and condensation, which goes on even in the coldest weather of the arctic winter.

Supposing this to account for the difference of the calculated and observed fall from November 1 to January 21, and admitting the fall from January 21 to April 1 to be three feet, added to the six feet found by Mr. Tinkham, there would remain on the ground at the latter date only two feet. This would be much further decreased by the greater amount of thawing in the two warmer months following January.

Or, by another process, we find that the difference between 39 feet, (26 + 13,) the amount calculated by the rains of Steilacoom and the true amount, would be in the same proportion as that between the amount predicated on the rains previous to January 21 and the actual depth

found by Mr. Tinkham, or as 26 : 6 : : 39 : 9; thus showing that the whole amount falling in the five months does not probably exceed nine feet, and this can only remain during the coldest weather—since the mean for December and January is, at the height of Snoqualmoo Pass, only four degrees below freezing.

It is not probable that as much moisture is deposited in the pass as at the sound. It is at a greater distance from the sea. And in consequence also of its great elevation there would be a rarefaction and coldness in the atmosphere which would tend to make it less humid. It is a fact, ascertained by experiment, that in the same storm rain-gauges near the surface of the ground are made fuller than others at a few hundred feet elevation directly above them, showing probably that the drops of rain must increase in size as they descend, by accumulating moisture.

The western spurs of the Cascade range must intercept much of the snow (or moisture) before it reaches the pass; and if we should admit the hypothesis that the amount of moisture falling in the pass is the same as at the sound, we must also admit that the same amount falls on the plains east of the mountains, contrary to actual observation.

The depth found in February, by Lieutenant Grover, along Clark's Fork, two and one-half feet, would be produced by two and one-half inches of moisture; and it is stated expressly by him that there was none on the plains from Spokane river southward, while east of the Bitter Root range none was seen by him or by Lieutenant Mullan over a foot in depth.

Snow lines, at a height of twenty-five feet, on trees are produced by drifts lodging against them, and the Indians walking over the surface on snow-shoes would be unable to determine whether the snow was drifted on a surface everywhere uneven and remote from their winter homes where they are acquainted with the ground. Hence probably arose the information derived from them, that the depth of snow was usually so great.

The presence of the evergreen spruce and pine timber prevents thawing, and thus assists in the accumulation of drift upon drift, while the effect to be expected from opening the surface to the sun may be estimated by the fact that, as just stated, Lieutenant Grover found no snow on the Spokane prairie, while just before he came out of the timber there was a depth of two feet.

The whole evidence favors the belief that there is not a greater depth of snow in the highest six miles of the pass than on the line of the Portland and Montreal railroad, and that it passes off about as early, while the rest of the route is never liable to be impeded by snow.

On no other point of the route between the Mississippi and the Cascade mountains is the precipitation of snow as great as in this interval. At Fort Snelling, admitting that all the moisture of the three winter months should fall in the form of snow, we find that the maximum of nineteen years' observations is only 5.47 inches melted, or 54.70 inches snow, (4½ feet,) and the minimum ½ an inch of snow. The mean for the same period is only 19.20 inches. Going westward, the deposition rapidly decreases until approaching the Rocky mountains, where the influence of the west winds probably causes an increase, but at the same time mostly in the form of rain. Mr. Doty records: "December, 1853, no snow or rain during this month;" in January 7½ inches, (1.6 inches moisture;) February, including both snow and rain, 11 inches, (3.4 inches,) none of which remained long on the ground. On the Great Plain of the Columbia Lieutenant Grover found no snow in the end of February, although the accumulated snows of the winter were 2½ feet deep in the woods along Clark's Fork, the deepest he met with. The mildness of the winters, compared with Fort Snelling, will not permit us to make the same

estimate from the amount of moisture in winter as we have done there, especially since we find that at Fort Benton, with a winter 5° colder than on the Great Plain, the proportion of snow to moisture was only 18.5 to 5 inches, while at Fort Snelling we allow 50 to 5 inches.

The register of rain and snow at Fort Benton for one year, although imperfect, still shows that less moisture is there deposited than at Fort Laramie; and although the amount is much greater west of the Rocky Mountain divide, as shown by the comparison of the number of days in which rain or snow fell at Cantonment Stevens, yet none of the parties who traversed that part of the route in any winter month found snow enough to interfere with a railroad.

OBSERVATIONS ON THE ISOTHERMAL CHART.

The isothermal lines east of the Mississippi are copied from Blodgett's Climatology of the United States, published in 1857. These do not differ much at the sea level from those determined by the Smithsonian, and published in the Patent Office Agricultural Report for 1856, but are curved on the land to conform generally with the undulations of the surface, their correctness being tested by numerous and long-continued observations at fixed points, by which the local influences, independent of latitude and altitude, may be considered pretty well established.

The direction of these lines west of the Mississippi and north of latitude 50° have been determined partly from the same and partly from data additional to those used by Mr. Blodgett, and they are found to vary so much from his conclusions that a statement and discussion of them is rendered necessary.

1. *Red River of the North.*—Mr. Blodgett gives in his table of statistics only seven months' observations at Pembina, latitude 49°, and at such irregular intervals that only part of them can be used for computing the means for spring and summer. A year's observations at Fort Garry, latitude 50° 15′, near the mouth of the river, are used in this computation, showing a difference of about four degrees for the two places at corresponding seasons, which, being about that due to latitude in this region, makes the mean for winter reliable as the true winter climate of the place. The following table shows the comparative results thus obtained:

	Latitude.	Longitude.	Altitude.	Spring.	Summer.	Autumn.	Winter.	Year.	Mean.
	° ′	° ′	Feet.	°	°	°	°	°	
Fort Snelling	44 53	93 10	820	45.6	70.6	45.9	16.1	44.6	35½ years.
Fort Ripley	46 19	94 19	1,130	39.3	64.9	42.9	10.0	39.3	6 years.
Pembina	49 00	97 00	900	34.3	71.7				7 months.
Fort Garry	50 15	97 00	860	35.8	67.8	40.8	6.9	37.8	1855–'56.

The lower altitude would account for the mean annual difference being in favor of Fort Garry over Fort Ripley, even supposing that the summer temperature is not too great, which it may very possibly be from local circumstances.

The table for Fort Garry is copied from the "Report of the Exploration of the country between Lake Superior and the Red River Settlement," Toronto, 1858.

The next points in the lines in which alteration was found necessary are those where the isotherms for winter (isochimenes) strike the Missouri between the mouth of the Platte and Fort Union. The materials at Mr. Blodgett's command were very imperfect for this portion,

and three years' continuous observations at Fort Pierre, with one also at Fort Randall, furnish much more reliable data. The mean results for winter are given in the table below.*

	Latitude.	Longitude.	Altitude.	1854–'55.	1855–'56.	1856–'57.	Mean.	Remarks.
	° ′	° ′	Feet.	°	°	°	°	
Fort Kearney	40 38	98 57	2,360	33.1	13.7	14.8	20.5	Mean 23°.0; 6½ years' observations.
Fort Randall	43 01	98 12	-------	------	------	9.0	------	
Fort Pierre	44 23	100 12	1,660	24.6	13.1	9.9	15.9	
Fort Clark	47 00	100 45	1,876	------	------	------	------	13°.20, winter, 1833–'34.
Fort Union	48 00	104 00	2,022	------	------	------	------	19°.4, January, February, 1833.
Fort Snelling	44 53	93 10	820	16.8	9.1	7.5	11.1	Mean 16°.1; 35½ years' observations.

A comparison of these winters is made with those at the nearest points where long series have been obtained, from which it appears that the mean of the three winters at Fort Pierre is probably near the true mean, since the same winters at Fort Kearney vary only 0.60 from that of six years at that post, although each separately varies widely.

But the observations at Forts Clark and Union in 1832–'33 are not so easily reconciled. The same years observed at Fort Snelling, the nearest post, show that entirely different climatic conditions affect the three places.

	January, 1832.	February, 1832.
Fort Snelling	17°.2	6°.5
Fort Union	21.3	17.5

	Winter, 1833–'34.	Mean of 35 winters.
Fort Snelling	22°.7	16°.1
Fort Clark	13.2	----------------

The only conclusion from the comparison is, that Fort Union partakes of the milder winter climate of the western coast, as observed still more strikingly at Fort Benton. Forts Kearney and Laramie occupy a similar relation to each other and to the Pacific climates, and the long series at those posts show that the former has a winter temperature 7°.10 colder than the latter, while the periodical curves follow nearly the same course, keeping from four to ten degrees below. A similar relation of climate may be expected to prevail between Forts Union and Benton. But Fort Clark shows two winter months much colder than for the same period at Fort Snelling, which, together, were 3°.85 below the average of thirty-five years. This, together with the great differences in the three winters observed at Fort Pierre, favor the conclusion that this portion of the Missouri lies intermediate between the two systems of climate (for winter) east and west of it, and that the prevalence of winds from either quarter determines the character of the weather. Both extremes seem to be represented by the Fort Pierre series,

* Mr. Blodgett's book gives the isochimenal line for this part of the Missouri five degrees higher than he had fixed it in the charts of the Surgeon General's Meteorological Register of 1855, but he does not give any data for the change, and the former appears most correct.

and the difference of latitude and elevation would show that the winter of 1833–'34 was somewhat below the average for Fort Clark, even supposing it to be influenced less than Fort Union by the western climatic characteristics which probably reach it to some extent.

The late surveys of Lieutenant Warren in Nebraska demonstrate that a large portion of the country put down as arid plains in Mr. Blodgett's charts is really occupied by the Black Hills, a tract of mountainous country well wooded with pine forests on its higher parts, and many portions of it tillable.

The influence of this correction can be scarcely estimated without further exploration of the country west of it, but it may be supposed to be very considerable. The greater cold of the winters at Forts Clark and Pierre may be accounted for by the fact that the hills favoring the precipitation of more snow and intercepting the mild westerly winds, which, having here a much wider and higher tract of mountains to cross than they have either to the north or the south, naturally permit a more free scope to the cold winds from the northeast.

If the isochimenal lines of 20° and 25° are to be connected at all between the Mississippi and the Upper Missouri, they must run west of these Black Hills across a low tract of country supposed to exist there, but which is yet quite unexplored.

The chart for winter in the Surgeon General's Meteorological Register appears to express much more nearly the direction of these lines, as determined by the latest observations, than those given by Mr. Blodgett himself.

The temperature, both of Fort Kearney and Fort Riley, appear too high for winter, and the observations of three additional years lower them both considerably. Forts Benton and Laramie hold a similar position in relation to each other, and seem to be wholly influenced by the climate of the western part of the continent. The following table shows their correspondence, and is not altered from the data used by the Surgeon General and Mr. Blodgett. The intervention of a wide tract of unexplored mountainous country makes it impossible to connect the lines, with any approach to certainty, between these posts and those towards the east.

Means for 1853–'54.	Latitude.	Longitude.	Altitude.	Spring.	Summer.	Autumn.	Winter.	Yearly mean.	Remarks.
	° ′	° ′	*Feet.*	°	°	°	°	°	
At Fort Benton	47 49	110 36	2,780	49.9	72.8	44.5	25.4	48.2	One year's observations.
At Fort Laramie	42 12	104 47	4,519	49.1	73.1	50.8	30.2	50.8	Six years' observations; mean, 50°.1.

The winter of 1853–'54, at Fort Laramie, was below the mean, and the same may be assumed of that at Fort Benton—an assumption which is supported by the results of the observations during the following winter at Fort Owen, alluded to hereafter. Thus the mean winter temperature at Fort Laramie, for six years, was 31°.1.

The next points westward which admit of comparison are Fort Owen and Cantonment Stevens, both in Bitter Root valley, and only fourteen miles apart, with Fort Hall, on Snake river, and Salt Lake City. It must be remarked that the only winter observed at Fort Hall (1849–'50) seems to have been unusually cold at Fort Laramie, the nearest point recorded, and two degrees may be allowed as the true correction for the mean winters at that place. This is not, however, made in this table.

Means for 1853-'54-'55.	Latitude.	Longitude.	Altitude.	Spring.	Summer.	Autumn.	Winter.	Yearly mean.	Mean, &c.
	° ′	° ′	Feet.	°	°	°	°	°	
Cantonment Stevens	46 20	113 55	3,412	48.0	69.6	45.6	24.9	47.0	1853-'54 } mean for winter, 27° 6.
Fort Owen	46 35	113 55	3,284	......	......	......	30.3	......	1854-'55 }
Fort Hall	43 04	112 27	4,500	......	......	47.4	23.6	......	Winter, 1849-'50.
Salt Lake City	40 46	112·06	4,351	51.7	75.9	......	35.3	......	Winter, two years, 32°.1.

There seem to be no data to warrant the extension of summer temperature of 70° much north of the Missouri river, as has been done by Mr. Blodgett in his last work, and it is accordingly made to run near the côteau north of that river, which rises several hundred feet above it, forming the ridge between it and the Saskatchawan. On the other hand, west of the mountains, the line of 70° is substituted for 65° for Bitter Root valley, the prairies near Flathead lake, and thence down the valley of Clark's Fork and the Columbia, from Fort Colville south. The rapidly decreasing altitude compensates for the greater distance north of part of this tract; but allowance should be made, in some places, for the local influence of surrounding mountains and forests.

The whole of the Great Plain, and the unwooded hills and valleys north and west of the Great Bend of the Columbia, are assumed to have a mean summer temperature above 70°, which is partly proved by a comparison of temperatures on the same days at Fort Dalles and in the Yakima valley.

A series of observations at Fort Walla-Walla, twenty-nine and a half miles east of the Columbia, at the confluence of the Walla-Walla with that river, altitude 1,396 feet, shows that the lowest parts of the plain have a summer temperature as high as 73°, and a line has been drawn to approximately include this district.

The following are the means of observation at this post, (uncorrected:)

Fort Walla-Walla, 1857-'58.—Summer, 73°.1; winter, 34°.1; autumn, 52°.6; spring, 51°.8. The winter, compared with the mean for four winters at Lapwai, on the Kooskooskia, and five at Fort Dalles, appears a little below the average for the latitude and elevation.

From the two former records the mean for the Great Plain is assumed as above 35° in winter, though records at Fort Colville are wanting to complete the curve, and the northern parts of the region included may be a little colder.

25° is retained as the mean for the Bitter Root valley, although the second winter's observations, as already shown, raises it to 27°.6. The lines of 65°, 60°, and 20° are approximately located, by allowing 3° for each 1,000 feet, at points whose elevation is known, and then connecting them.

There is too little known of the geography of Oregon to make a safe connexion between the known points in Washington Territory and Utah.

No records for any point, except the Dalles, exist from which the summer lines can be projected in the interior of Oregon, and too few altitudes are known to make even an approximation by reduction from better known regions.

West of the Cascades and Sierra Nevada the lines are drawn from the same data recorded in Mr. Blodgett's book, but altered to conform more closely to the surface of the country. The fixed points at which they were taken being usually in valleys, or on the low land along the coast, with high mountain ranges intervening, the lines are made to include only so much of

the country around each post of observation as, from elevation and surrounding circumstances, can be considered as having a similar climate.

Fort Jones, the only very elevated post, (2,570 feet altitude,) when compared with Oregon City or Vancouver, both north of it, shows the influence of local situation on climate, and the impossibility of connecting the isothermal lines naturally in so undulating a country.

The following table gives a comparison of the mean temperatures on a line of stations between latitude 46° and 48°, from the mouth of the St. Lawrence to Puget Sound, those points being selected which are nearest the great route of travel by the St. Lawrence, the lakes, and the proposed railroad route across the continent.

Station.	Latitude.	Longitude.	Altitude.	No. of years.	Spring.	Summer.	Autumn.	Winter.	Yearly mean.	Authority, &c.
	° ′	° ′	Feet.		°	°	°	°	°	
St. John's, Newfoundland	47 33	52 43	140	5	32.3	54.0	43.8	23.2	38.3	Templeman, Am. Jour. Sc.
Quebec, C. E.	46 49	71 16	300	10	38.6	65.3	44.0	13.3	40.3	Dr. Sparks, Latour, Mp.
Fort Brady, Mich.	46 30	84 43	600	31	37.6	62.0	43.5	18.3	40.4	U. S. A. Met. Register.
Fort Wilkins, Wis.	47 30	88 00	620	2	38.5	60.8	43.0	21.8	41.0	Do.
Fort Ripley, Minn.	46 19	94 19	1,130	6	39.3	64.9	42.9	10.0	39.3	Do.
Fort Garry, Red river	50 15	97 00	860?	1	35.8	67.8	40.9	6.8	37.8	Rept. Expl. Red river, 1858.
Fort Clark, Neb.	47 00	100 45	1,876	5–12	....	....	....	13.2	....	Prince Maximilian.
Fort Union, Neb.	48 00	104 00	2,022	9–12	44.1	70.1	....	....	....	Do.
Fort Benton, Neb.	47 49	110 36	2,780	1	49.9	72.8	44.5	25.4	48.2	Doty, N. P. R. R. Exp.
Cantonment Stevens, W. T	46 20	113 55	3,412	1	48.0	69.6	45.6	24.9	47.0	Burr, N. P. R. R. Exp.
Bitter Root valley, W. T.	46 35	113 55	3,284	1½	47.0	69.6	45.5	27.6	47.4	Do.
Lapwai, W. T.	46 27	117 00	1,000?	2¼	51.0	70.3	51.2	36.9	52.4	Spalding, Wilkes's Expl. Exp.
Fort Walla-Walla, W. T.	46 03	118 25	1,396?	1½	51.9	73.1	53.6	34.1	53.2	U. S. A. Met. Register.
Fort Dalles, W. T.	45 36	120 55	300?	3¼	53.0	70.3	52.2	35.6	52.8	Do.
Vancouver, W. T.	45 40	122 30	50	6	51.9	65.6	53.5	39.5	52.6	Do.
Astoria, Oregon	46 11	123 48	50	1 2–12	51.1	61.6	53.7	42.4	52.2	Do.
Steilacoom, W. T.	47 10	122 25	200?	5¾	49.2	62.9	51.7	39.5	50.8	Do.

COMPARISON OF NEBRASKA WITH REGIONS HAVING A SIMILAR CLIMATE IN EUROPE, &c.

Nebraska and Western Minnesota (called Dacotah) lie between the parallels of 40° and 49° north latitude, and may be limited for the present comparison by the Rocky mountains, which form its western boundary, and a line running parallel to them in a northwestern direction, from the intersection of the Missouri with latitude 40° to latitude 49°, giving an average width of 650 miles, and an area of 350,000 square miles. This large area has, in the plains, mean temperatures as follows, stating the means for each season as observed at stations as near as possible to each of its four corners.

Southeast corner: Fort Kearney, 6 years' observations, latitude 40° 38′, longitude 98° 57′, altitude 2,360 feet.

	°
Spring	46.8
Summer	71.5
Autumn	49.3
Winter	23.0
Year	47.7

Southwest: Fort Laramie, latitude 42° 12′, longitude 104° 47′, altitude 4,519 feet.

	°
Spring	46.8
Summer	71.9
Autumn	50.3
Winter	31.1
Year	50.0

Northeast: Fort Garry, latitude 50° 15′, longitude 97°, altitude 860 feet.

	°
Spring	35.8
Summer	67.8
Autumn	40.9
Winter	6.9
Year	37.8

Northwest: Fort Benton, latitude 47° 49′, longitude 110° 36′, altitude 2,780 feet.

	°
Spring	49.9
Summer	72.8
Autumn	44.5
Winter	25.4
Year	48.2

The moisture deposited during each season is expressed, as nearly as possible, by the following registers at the same places:

	Spring.	Summer.	Autumn.	Winter.	Year.
	Inches.	*Inches.*	*Inches.*	*Inches.*	*Inches.*
Fort Kearney	10.80	12.05	3.82	1.31	27.98
Fort Laramie	8.69	5.70	3.96	1.63	19.98
Fort Benton	4.92	1.00?	2.10?	5.10	13.12
Means for the region	8.14	6.25	3.29	2.68	20 36

But these posts are on the borders of the dry plains lying between them, and known to have a drier climate, so that to be within the bounds of probability the mean of the two lowest records may be used for that of the whole region, which gives: for spring, 6.80; summer, 3.35; autumn, 3.03; winter, 3.36; year, 16.54 inches.

The records kept for twenty-three months during the years 1855–'56–'57, at Fort Pierre, give the following results: spring, 4.66; summer, 3.30; autumn, 3.81; winter, 2.27; year, 14.04 inches.

This post is probably in the very driest part of the whole country, being at a distance from the rains which descend upon the eastern part of the country towards the Mississippi, and also from the local influences exerted by the Rocky mountains on the west. The records being unreliable at Fort Garry, those of Fort Ridgley, Minnesota, latitude 44° 15′, longitude about 94° 47′, altitude 1,100 feet, may be substituted, giving for the northeast borders, five years: spring, 7.39; summer, 8.73; autumn, 5.98; winter, 6.04; year, 28.14 inches; and for region: spring, 7.76; summer, 7.49; autumn, 4.63; winter, 4.36; year, 24.25 inches.

The only country of the Old Continent which can be compared with this in extent and climate, as well as in some degree in natural features, is the empire of Russia, concerning which the following facts are extracted from Tegoborski's "Commentaries on the Productive Forces of Russia," published in London, 1855.

"6. *Region of the Steppes.*—The steppes extend from the mouth of the Danube along the shores of the Black sea, the Sea of Azow, and across the lower parts of the Don, the Volga, and the Ural, into the plains of Central Asia. It embraces the governments of Bessarabia, Kherson, Ekathèrinoslaw, Tauride, (Crimea,) Stavropol, (Caucasia,) Astrakhan, and the country of the Don Cossacks."

These all lie between latitude 49° and the Black sea, excepting Stavropol and Astrakhan, which extend south, between it and the Caspian sea, to latitude 44°.

The area embraced in these provinces is 244,525 square miles,* and the remainder of the surface southward, to latitude 40°, is mostly occupied by the Black sea and the Caucasian mountains, which, of course, are to be disregarded in a comparison of plains, although they might to some extent represent the Black Hills and other mountains of Nebraska.

* Colton's Atlas.

For comparison of climate the three following places in these provinces may represent Forts Kearney, Laramie, and Benton.

	Spring.	Summer.	Autumn.	Winter.	Year.	No. years.
	°	°	°	°	°	
Benton, Taganrog, latitude 47° 12′	46.6	70.2	47.8	22.3	46.7	16
Kearney, Ekathérinoslaw, latitude 48° 20′	46.5	70.3	48.7	19.6	46.3	10
Laramie, Odessa, latitude 46° 29′	45.7	70.1	50.7	27.4	48.5	8

No point in this region has winters so cold as those of Fort Garry, and the nearest approach to its climate in Russia is found as far north as Kazan, on the Volga. Kazan, latitude 55° 48′: spring, 36°.2; summer, 62°.4; autumn, 36°.9; winter, 6°.3; year, 35°.5; number of years, 10.

In comparing the amount of moisture deposited in rain and melted snow the following places are selected, there being no records of the places used in comparison of temperature:

To represent Fort Kearney, Koursk, latitude 51° 44′, four years' observations: spring, 5°.6; summer, 9°.3; autumn, 4°.0; winter, 1°.9; year, 20°.8.

For Fort Laramie, Tiflis, latitude 41° 42′, six years' observations: spring, 6°.2; summer, 7°.6; autumn, 3°.5; winter, 1°.9; year, 19°.3.

For Fort Pierre, Simferopol, latitude 44° 57′, five years' observations: spring, 3°.2; summer, 6°.0; autumn, 3°.4; winter, 2°.2; year, 14°.8.

For Fort Benton, Bakou, latitude 40° 22′, three years' observations; spring, 3°.3; summer, 1°.5; autumn, 3°.1; winter, 4°.3; year, 13°.4. No point within the limits has so much precipitation as Fort Ridgley, but it comes nearest to Catania, in the fertile island of Sicily, or parts of Prussia and Italy, but has a larger precipitation in spring and summer. Catania, latitude 37° 50′, eight years' observations, has for spring, 7°.1; summer, 0°.6; autumn, 10°.5; winter, 9°.7; year, 28°.1. The record for Fort Benton being quite incomplete, further observations will, doubtless, give it more moisture, approaching the mean for Fort Laramie, if not exceeding it, since near the western coast more is deposited northward than southward.

The data for European localities are copied from Blodgett's Climatology, where Dovè is given as authority for most of them, and they may, therefore, be considered very reliable. In geological formation and soil the same remarkable similarity is apparent. "Mr. Haxthausen divides the steppes geognostically into five classes or formations:

"1. The cálcareous tertiary formation predominates in Bessarabia, in Podolia, and in a small part of the government of Kherson.

"2. Chalk forms the basis of the soil in the north, and embraces the steppes in the governments of Kharkow, Woronèje, Tambow, part of the country of the Don Cossacks, and of the government of Saratow.

"3. The granitic basis, which is derived from the Carpathians, extends along the Black sea and the Sea of Azow, on to the Caucasus.

"4. The mud steppes extend on the southwest along the Kouban and the Terek.

"5. The steppes with a saline basis extend on the east to the river Taïk."

Nos. 1 and 2 are precisely the tertiary and cretaceous formations which form nearly all the plains of Nebraska, &c., west of the 98th meridian; No. 3 is found along the foot of the mountains; No. 4 is represented in the alluvial river bottoms; and No. 5 occurs in scattered situations in the western part of the Territory. Nebraska has also carboniferous limestones,

sandstones of different ages, and other rocks not mentioned as occurring in that portion of Russia.

In the classification of the relative fertility of soils in the various provinces of Russia, those here described are grouped as follows: "Soil in general of great fertility; Bessarabia, (Koursk.*) A large portion of the soil very fertile; Ekathérinoslaw, Tauride, Kherson, Stavropol, Don Cossacks country. Soil very meagre and ungrateful, either from its rare qualities or from the climate; Astrakhan." In another table is given the proportion of meadow to arable land in each province, with the following figures to each hundred: "Koursk, 24.5; Bessarabia, 92.3; Ekathérinoslaw, 116.7; Kherson, 142.9; Tauride, 213.3; Stavropol, 533.3; Astrakhan, 533.3." And of forest land the proportions are: Koursk, $\frac{11}{100}$; Bessarabia, $\frac{5}{100}$; Tauride, $\frac{4}{100}$; Don Cossacks country, $\frac{2}{100}$; Kherson, $\frac{1}{100}$; Ekathérinoslaw, $\frac{1}{100}$; Stavropol, $\frac{8}{1000}$; Astrakhan, $\frac{8}{1000}$.

The land actually under cultivation is in the following proportions: "Koursk, 60.7 per cent.; Bessarabia, 30.1; Kherson, 20.9; Ekathérinoslaw, 19.7; Don Cossacks country, 15.6; Tauride, 12.8; Stavropol, 5.6; Astrakhan, 1." Of the remainder only a very small portion is estimated to be occupied by forests, and it is estimated that "in the eastern and southern provinces, and in all the countries of the steppes in general, more than half the uncultivated land, and frequently more than two-thirds of it, is used for pasture."

The following general remarks might be applied almost verbatim to Nebraska:

"This region," (the steppes,) "which occupies about a fifth of the whole possessions of the Russian empire in Europe, or more than twice the extent of France, is, both from its immense extent and from its geographical position, called to take an important part in the gradual development of the productive forces of Russia, and deserves on that account our particular consideration. The opinions which we have heard expressed with regard to the agricultural capabilities of these countries are various and conflicting. Some consider the larger portion of the steppes as unfertilizable deserts; others, dazzled by the prosperity of some isolated colonies, believe nothing wanting but hands and judicious culture to convert them into rich and fertile places.

"We have always thought it probable that the truth must be somewhere betwixt these two extreme opinions, and we have been confirmed in our surmise by the perusal of a paper by Koeppen. Amongst other peculiarities of the steppes, a very prominent and the most distinctive one is the absence of timber. In some places the stratum of soil proper for vegetation is not deep enough to admit of trees taking root; in others it is the vigorous growth of the grasses which prevents the development of forest vegetation unaided by the care of man. Opinions differ greatly as to the possibility of wooding it anew. Upon comparing all the information we possess upon this point, it may, we conceive, be laid down as certain that in part of the steppes sylviculture is impossible, or at least too difficult and costly to warrant the attempt, whilst in other portions partial plantations and sowing would be a very practicable undertaking, holding out a fair promise of a large ultimate benefit. The most suitable localities for such improvements would be the banks of rivers and the numerous ravines formed by the infiltration of rain water.

"The upper stratum of the soil presents every variety of composition, from shifting sands and saline impregnations to the most fertile composts. As this stratum generally rests upon a basis not very accessible to infiltration, it is upon its thickness that the degree of its fertility depends. Where it is not deep enough to retain the moisture, it easily becomes saturated with

*This, though north of latitude 49°, is compared with Fort Benton, having a climate colder and drier.

rain water and as easily dried up by evaporation. This is, of course, an immense impediment to culture in countries where droughts are so frequent and of so long duration that it is nothing uncommon for twenty months to pass without a single copious shower of rain. It is not so bad as this in all the steppes, but such is at least their predominant character in several governments of the south and east. This infrequency of rain, joined to the want of reservoirs, forms notoriously one of the chief drawbacks of the country; but the vegetation of that part of the steppes which is used merely as pasture possesses a peculiar character, by which the deleterious influence of drought is diminished.

"Nature here exhibits her wonderful variety of resource. Spring vegetation generally lasts in these countries for about three months; if this period pass without a sufficiency of rain the herbage does not attain its natural height; it is dried up whilst its sap is still in full vigor, and in this state it affords a substantial food for cattle for the space of nine months. These pastures are particularly suitable for sheep. When, on the other hand, the spring rains happen to be in excess, the vegetation becomes too rank, the herbage attains four times its usual height, the pasture at the same time becomes less wholesome and nourishing, so that by a strange anomaly in this country, where the general complaint is of drought, those proprietors who possess heavy stocks of sheep prefer a dry season to a superabundance of moisture.

"The vegetation of the pasturage steppes presents another peculiarity, namely, that it is not equally spread over the surface of the soil, but is found scattered as it were in little islands. A continuous sward is to be met with only in very low valleys."

In reading this account the traveller who has been across Nebraska must be struck with the similarity of the general character of both countries; but it remains for more complete surveys to determine what proportion of the country will be found to be perpetual plains, (that is, those in which cultivation is difficult, and the culture even of fruit trees requires incessant attention,) and what portions will admit of general cultivation.

The statistics of ten years' cultivation of one of the estates situated in a perpetual steppe in the Crimea shows the average returns of wheat and rye to be 6, barley 7, and millet 23. Some years there was a return of 16 from rye, 15 from wheat and barley, and 64 from millet, but there was one year when the harvest was a complete failure, and others when it barely returned the seed. Simferopol, which has about the same moisture as Fort Pierre, is in this region, but its temperature approaches nearest to that of Odessa and Fort Laramie.

Another author quoted by Tegoborski classifies the empire of Russia in regard to physical culture in eight zones, as follows:

1. The icy zone. 2. The marshy zone; both inhabited chiefly by Laplanders.

3. Zone of forest and of cattle rearing; the northern part inhabited by nomades, and the southern only showing any cultivation.

4. Barley zone, where, from the shortness of the summer, only this grain, potato, and a few garden vegetables can be cultivated, extending south to latitude 63°.

5. Zone of rye and flax, which are the most successful crops, extends south of latitude 51°.

6. Zone of wheat and garden fruits, extending south to Ekathérinoslaw, or to the 48th degree, and including Koursk, thus entering the region which we have compared with Nebraska as to soil and climate. "The provinces which it embraces supply the provisions of St. Petersburg and of a great part of the army, besides furnishing cereals in considerable quantities for exportation. The culture of tobacco begins to acquire importance, and is much more extensive than in other parts of the empire."

"7. Zone of maize and of the vine. This zone embraces Bessarabia, New Russia, the country of the Don Cossacks, the government of Astrakhan, the provinces of the Caucasus, and the Crimea. Independently of all the productions of the preceding zones, the vine is cultivated with success in several parts of this region, and the culture of maize is widely diffused." Locusts (grasshoppers) and droughts are, as in Nebraska, the chief obstacles to cultivation in Kherson and Ekathérinoslaw, and pasturage of cattle occupies more and more of the steppes in going east. Even in Astrakhan, which presents but a meagre pasturage, the soil is tolerably well adapted to the culture of the vine. "The cultivation of gardens and the rearing of sheep are carried on to a considerable extent in this zone, but this part of Russia is essentially deficient in forests. More care ought to be devoted to the working of coal, of which extensive strata have been discovered."

Thus it appears that these very provinces, in spite of their arid climate, are the most productive portions of Russia in Europe.

The following table gives the population in 1851 of these provinces, and their number per square mile:

Provinces.	Population, 1851.	Per square mile.
Koursk	1,728,000	98
Stavropol	1,004,000	17.6
Ekathérinoslaw	994,000	38.8
Kherson	919,000	32
Bessarabia	902,000	49.8
Don Cossacks	798,000	12.6
Tauride	665,000	26.6
Astrakhan	207,000	8.8
Total	7,217,000	Mean 35.5

The area of these provinces is 262,000 square miles, or a little more than two-thirds of the area of the country compared with it. Now we may see what amounts and what kinds of products are actually raised by these inhabitants from this area. It must be observed that the author classifies only the first of these as "exceedingly well peopled," or with more than 65 to the square mile, while three are of medium population, (over 32.5 to the square mile,) and the other four "weakly peopled," (with less than 32.5 to the square mile.) They are also the provinces which are attracting most attention, and whose population is increasing most rapidly by immigration from the more northern and barren regions.

Grain.—Of the provinces above mentioned, five produce more than they consume, two only sufficient for home consumption, and only one, Astrakhan, imports it. The average return for the provinces is six times the amount of seed sown, while for the whole empire it is only four. Wheat is cultivated to some extent, but rye is more common, while barley, oats, buckwheat, and maize or Indian corn are abundant, the latter being found only in these provinces.

Potatoes are less cultivated than towards the north, apparently from prejudice, but the amount raised in the five provinces bordering on the Black sea in 1847 was 2,108,160 bushels.

Beer root sugar is one of the most important products of Russia, and the amount for 1848 in Koursk and Kherson alone was 1,093,585 pounds from 2,324 acres employed in this manner.

Wines.—Only the province south of latitude 49° produce the vine, and of these the six here considered are the principal. In 1849, these produced 24,245,000 gallons, worth 2,804,100 dollars. If similar climate and soil prove anything, the same kind of vine should succeed as well in most parts of Nebraska.

The hop vine is native and abundant in the hilly parts of Nebraska and Washington Territories; and two or three native species of flax may become worthy of cultivation in both places.

These provinces also produce the principal parts of the fruits of Russia, especially apples.

Garden vegetables are, however, less productive. Hay and other fodder, being naturally supplied in abundance, is not much cultivated.

Flax is cultivated only for the oil of its seeds, though it succeeds well. *Hemp* is not produced.

Tobacco in these provinces is produced to the extent of about 2,500,000 pounds, the best being from Kherson and Tauride, and worth 20 cents a pound. This is probably the Turkish tobacco, which will grow in a dry climate.

The products of the great extent of grazing land form, however, a much more important source of wealth to these provinces; and the following numbers show what proportion of various stock may be expected as the future animal wealth of Nebraska:

Horses, 2,015,190; cattle, 4,754,450 ; sheep, 11,950,110. To the square mile: horses, 8; cattle, 18; sheep, 42 ; which, deducting the proportion of land otherwise used, would be much increased.

Hogs, poultry, bees, and silkworms also form a large proportion of the producing stock of these provinces, but need not be here included in the special estimates.

The export of wheat from the two ports of Odessa and Taganrog is over 18,000,000 bushels, while the three other principal ports, Archangel, St. Petersburg, and Riga, export only about 6,000,000 bushels, thus showing the far greater productiveness of the provinces bordering on the Black sea in this important staple.

Agricultural products of Red River valley from Pembina to Fort Garry, latitude 49° *to* 50° 15.′—(*Report on Exploration between Lake Superior and Red River Settlement, Toronto,* 1858, *p.* 319.)

Indian corn may always be expected to ripen, and is a sure crop on the dry parts of the prairie, while the rich and moist soil requires draining to produce it. The Horse-tooth and Mandan varieties are thus cultivated. It was found growing and ripening near the mouth of Winnipeg river, latitude 50° 30′.

Wheat.—This is the staple crop, and its general success and good quality are well known. Forty bushels to the acre is a common return on new land, and a Mr. Gowlee obtained fifty-six, with no improvement except deep ploughing to make the land dry. Wet springs are the greatest obstacle to its success, and the only reason it is not more cultivated is the want of a market. Rust and fly were unknown, but the grasshoppers have been very destructive. Barley and oats are so easily raised that they were not considered worthy of special notice.

Hay.—The natural growth is unlimited in quantity and excellent in quality.

Hops.—These grow wild everywhere and with the greatest luxuriance.

Peas.—Grow well and yield abundantly.

Tobacco is cultivated to a small extent, but appears to be badly dried and manufactured.

Potatoes are particularly distinguished for abundance, size, and quality.

Turnips, beets, &c.—All kinds of root crops grow well and obtain large dimensions. All common garden vegetables grown in Canada being equalled, if not surpassed.

Sugar.—Considerable quantities of sugar are made from the Ashleaved maple; but unless the tree is protected and planted the supply is likely to fail.

Flax and hemp were formerly much cultivated, but the want of markets or of machinery caused them to be discontinued, though the product was of excellent quality.

Lumber is to be got only in narrow strips, along the river banks, consisting of elm, oak, maple, and poplar, (cottonwood.) On the ridges are small aspens and pines. Abundant good pine grows, however, east of Lake of the Woods and Lake Winnipeg.

Live stock.—Horses, cattle, and hogs are increasing, but sheep diminishing in number, there being no use for their wool. They do not pay for raising. The prairies offer great advantages for stock raising; but there being no market for beef, mutton, tallow, hides, wool, &c., few, comparatively, are raised. The abundance of buffalo, and the great relative value of their skins, meat, &c., with the strong inclination of the people to a hunter's life, also tend to prevent stock raising.

Climate.—Compared with Toronto, the results for the year show that at the Red River settlement, latitude 50° 15′, as compared with Toronto, (latitude 40°, nearly,) there is:

Summer nearly 4° warmer.

Summer rains 21.74 inches more.

Mean of spring and summer nearly 1° higher.

Winter, 12°.6 colder.

Year, 8°.1 colder.

Annual rain and melted snow, 17.85 inches more. Snow, 33.4 inches less.

Winter extends through November, December, January, February, March. Spring and autumn only two months each.

The prevailing character of the winter months are long-continued, intense cold, with a clear, dry atmosphere. Mercury often freezes and remains congealed for many days together. In calm weather the intensity of the cold is not much felt, causing no suffering; in fact, the half-breeds and Indians camp out in the open plain during the whole winter, their only protection being a buffalo skin tent and plenty of robes.

The salubrity of the climate is shown by the fact that one medical man is not overburdened with work in a population nearly reaching 7,000.

CLIMATE OF WASHINGTON TERRITORY.

In the preceding pages the region having the most unfavorable climate of any on the route has been selected for comparison with southern Russia as to its capacity for agriculture. West of the Rocky mountains the comparison is much in favor of Washington Territory, as will appear by the following records :

Bitter Root valley, (Fort Owen,) latitude 46° 35′, longitude 113° 55′; altitude 3,284 feet; 1½ year's observations: temperature, spring, 47°.0; summer, 69°.6; autumn 45°.5; winter, 27°.6; year, 47°.4. Compared with Taganrog this shows an excess of 0°.6 in the year, and 5°.3 for winter, the other seasons being much the same at each place. No records of moisture exist, but the abundance and luxuriance of the forests in that part of the Rocky mountains, as well as the actual products of agriculture, show that it is quite sufficient. Its climate is superior

to that of Rochester or of any part of western New York, Michigan, Wisconsin, or Minnesota, as shown by the annexed table.

	Latitude.	Spring.	Summer.	Autumn.	Winter.	Year.
	° ′	°	°	°	°	°
Rochester	43 07	44.6	67.6	48.9	27.0	47.0
Detroit	42 20	45.9	67.6	48.7	26.8	47.2
Beloit	42 30	45.6	70.9	50.1	24.2	47.7
Fort Snelling	44 53	45.6	70.6	45.9	16.1	44.6

The two latter are the warmest points recorded in their States.

Lapwai, Kooskooskia valley, latitude 46° 27′, longitude 117°, altitude 1,000 feet; 2½ years' observations for temperature gives: spring, 51°.0; summer, 70°.3; autumn, 51°.2; winter, 36°.9; year, 52°.4.

Walla-Walla, latitude 46° 03′, longitude 118° 25′, altitude, 1,396 feet; 1½ years: spring, 51°.9; summer, 73°.1; autumn, 53°.6; winter, 34°.1; year, 53°.2. Dalles, latitude 45° 36′, longitude 120° 55′, altitude, 300 feet; 3½ years: spring, 53°.0; summer, 70°.4; autumn, 52°.2; winter, 35°.6; year, 52°.8. Of these, the mean may represent the climate of the Great Plain and of the valleys connected with it up to latitude 49°, which are about of the same or a lower elevation, giving us: for spring, 51°.9; summer, 71°.2; autumn, 53°.0; winter, 35°.6; year, 52°.7. The following places may be compared with this or with each separately: Paris, (France,) latitude 48° 50′, spring, 50°.6; summer, 64°.5; autumn, 52°.2, winter, 37°.8; year, 51°.3. Sebastopol, latitude 44° 36′: spring, 51°.6; summer, 70°.6; autumn, 53°.7; winter, 35°.9; year, 53°.0; and the other places in southern Russia already compared with Nebraska.

	Latitude.	Spring.	Summer.	Autumn.	Winter.	Year.
	° ′	°	°	°	°	°
Vienna, (Austria)	48 13	51.6	69.4	51.2	31.9	51.0
Philadelphia	39 56	51.8	73.6	54.1	32.9	53.1
Washington City	38 53	55.8	76.3	56.4	36.1	56.1
St. Louis, Missouri	38 40	54.1	76.2	55.4	32.3	54.5
Cincinnati, Ohio	39 06	53.7	74.0	53.9	33.7	53.8

With respect to moisture, no records exist for Lapwai, but the same remarks may be applied as are made on Bitter Root valley; Walla-Walla and the Dalles, however, are drier in climate, as shown by the records, Fort Walla-Walla, 1½ year's observations: spring, 6.40; summer, 2.85; autumn, 4.54; winter, 7.10; year, 20.89 inches. Dalles, 3½ years: spring, 2.63; summer, 0.42, autumn, 4.16; winter, 7.11; year, 14.32 inches. Mean: spring, 4.51; summer, 1.63; autumn, 4.35, winter, 7.11; year, 17.60 inches.

Taking either the mean or the lowest as the average for the whole of the Great Plain, we find that they compare favorably with Nebraska, and, consequently, with southern Russia, while, as we have seen, they surpass both in temperature. Actual experiment has shown the perfect success with which nearly all crops of the middle United States can be cultivated in the Walla-Walla valley, and at several other points near the Great Plain. Compared with other

parts of the interior of the continent southward and the coast of southern California we have a decided advantage.

	Spring.	Summer.	Autumn.	Winter.	Year.
	Inches.	*Inches.*	*Inches.*	*Inches.*	*Inches.*
Laredo, Texas	4.07	7.33	5.06	2.20	18.66
El Paso, New Mexico	0.70	3.56	5.25	1.70	11.21
Albuquerque	1.10	5.45	2.07	0.80	9.42
Fort Yuma	0.27	1.30	0.86	0.72	3.15
San Diego, California	2.74	0.55	1.24	5.90	10.43
Monterey, California	4.43	0.21	1.65	5.91	12.20
Benicia, California	6.40	0.01	2.65	7.56	16.62

All the interior of California has about the same amount as the last place quoted.

In the comparison of climate, as deduced from these observations in the vicinity of the Rocky mountains and thence to the Pacific, it must be remarked that the means of the series of observations at 7, 2, 9 will not approach so near the means of the twenty-four hours as they do in countries of more uniform surface. As is well known the nights are always cold among mountain ranges, no matter how high the temperature may rise during the day. The only series of observations from which corrections for the mean temperature of the twenty-four hours can be approximately deduced is that made at Sacramento, California, by Dr. T. M. Logan, and published in the Smithsonian Report for 1857. These have not been extensive enough to warrant their adoption as constant, but they give a good idea of this great diurnal range in the thermometer. From his series of hourly observations, made on only one day in each month, it appears that the hours when the temperature approaches nearest the mean for the day are: in—

Spring, 7.30 to 9.53 a. m.; 8.16 to 9.19 p. m.

Summer, 7.33 to 8.54 a. m.; 8.6 to 8.47 p. m.

Autumn, 8.42 to 10.47 a. m.; 9.55 to 12.35 p. m.

Winter, 10.45 to 11.30 a. m.; 9.30 to 12.30 p. m.

The difference between the hourly mean and that derived from the three daily observations is, for spring, —1° 2; summer, —1° 2; autumn, +0° 2; winter, +0° 1; year, +0° 6, to be added or subtracted from the mean of observations made at the hours of 7, 2, and 9. At Rochester, New York, it has been ascertained, by a long series of careful observations made by Professor Dewey, to be, for observations made at the hours of 7, 2, 9, spring, —0° 8; summer, —0° 8; autumn, —0° 5; winter, —0° 5; year, —0° 6. If, as is most probable, the Sacramento corrections approach nearest to the truth for the interior of Washington Territory, we have an unexpected additional testimony in favor of its winter climate, as well as its mean annual temperature.

The deduction of 1°.2 from the summer heat is, however, less than was to be expected. The cold nights show their principal effects on vegetation, in the fact that Indian corn, and perhaps some other crops, which are the chief products between the latitudes of New York and Baltimore, where the summer heat is similar, are not certain crops, though cultivated even at Fort Colville and at other places to the southward. They succeed well, however, in Walla-Walla and the Nez Percés country.

Dr. Logan says of Sacramento: "One of the most striking features of the climate is the greatest reduction of temperature after the hour of maximum elevation. However high the

wave of temperature towers up under the influence of a vertical sun and cloudless sky, it sinks proportionately low during the night, rendering it cool and chilly." The range of difference is there sometimes 41° in July, and the mean range for that month 22°.1. The range for the three summer months is 19°.6 or 79°.7 for the greatest heat by day, and 60°.8 for the mean coldest hour of the night. This evidently arises from the fact that the more the air is rarefied and ascends by day, the more cold air from the neighboring snowy mountains must rush down to take its place at night, until, as in August, even that of the mountains becomes so heated that the minimum range of 16°.3 is reached. His table is the result of two years' observations. The range will be less in direct ratio to the distance of any given place from the snowy or lofty mountains. It is probably, also, less where, as in this Territory, the greatest heat by day differs least from the mean, or from the mean temperature of the neighboring mountains.

One of the greatest agricultural advantages of the climate near the Pacific coast is in the earlier commencement of spring and later coming of winter, which makes the growing season at least a month longer, and prevents the droughts of summer from seriously interfering with cultivation.

This fact is shown to exist by the comparison of the means for the three winter months, as already made in the tables of climate in places of similar annual temperature. It is also well known to characterize and influence materially the processes of agriculture in California and elsewhere. To demonstrate its application to the region now under consideration I give a table of comparison of February, March, and December, with places already used in this connexion:

	February.	March.	December.
	°	°	°
Bitter Root valley, means of two years	30.7	35.5	29.5
Rochester, New York, 24 years	26.4	33.1	28.5
Detroit, Michigan, 13 years	26.6	35.4	26.9
Beloit, Wisconsin, 6 years	25.8	33.8	24.0
Fort Snelling, Minnesota, 35½ years	17.6	31.4	16.9
Fort Benton, Nebraska, 1 year	26.6	36.2	33.0
Lapwai, 2½ years	33.8	42.7	40.4
Walla-Walla, 1½ year	34.5	42.7	38.6
Dalles, 6 years	40.0	46.4	33.7
Vienna, Austria	33.5	40.8	33.0
Philadelphia, 20 years	36.3	45.6	37.1
Washington, 13 years	36.7	45.3	37.3
St. Louis, 23 years	35.0	44.0	33.6
Cincinnati, 20 years	34.1	43.5	34.5

We thus find that cultivation may be commenced some days earlier in the Territory than at places several degrees further south in the Atlantic States, and some weeks earlier than in places of the same latitude. Allowing for the close vicinity of all the western territory posts to mountain ranges, we may suppose that a still greater difference exists in certain localities on the Great Plain, where the greater dryness of summer also requires an early cultivation for success. The difference will be at once apparent, to farmers especially, as a mean temperature below 32° prevents ploughing in winter and various other operations, and stops entirely the

growth of several winter crops, which in the mild winters near the western coast make considerable progress. Grazing is excellent throughout, precluding the necessity of laying up much supply of fodder.

Even comparing the elevated interior with various places much further south, we find the advantage still in our favor:

	Latitude.	Altitude.	Years obs.	February.	March.	December.
	° ′	*Feet.*		°	°	°
Albuquerque, New Mexico	35 06	5,032	5	39.6	47.9	36.0
Fort Laramie, Nebraska	42 12	4,519	6	32.6	36.8	28.0
Salt Lake City	40 46	4,351	$3\frac{10}{12}$	35.0	39.7	34.1

which will not be exceeded in any part of the interior of Oregon, except near the Columbia, on account of the greater elevation of all parts of that country.

Having, as already shown, more moisture deposited during winter and spring than any point in Nebraska, or near latitude 32° to 35°, and having a spring allowing of earlier cultivation than the former, and even many parts of the latter region, there seems no climatic reason why the interior of Washington Territory should not produce abundantly all that can be cultivated in them, even without irrigation, or even more, as in the case of California.

Dr. Logan considers February the first month of spring at Sacramento, and includes only December and January as winter months. Adding to these half of February and half of November, we may consider the three months thus formed the agricultural winter of the great plain. Mr. Blodgett estimates it at one hundred and ten days for Lapwai from November 11 to February 28, and seventy days at San Francisco.—(*Climatology*, p. 500.)

Of the climate west of the Cascade mountains little need be said in addition to what is contained in Vol. I.

It was there stated that along the coast the prevailing sea breezes from the southwest in winter, and the northwest winds in summer, so modify the climate that the isothermal lines run nearly parallel to the coast, making the climate of Puget Sound nearly as mild, and in summer more agreeable than at San Francisco, while it corresponds closely with that of the western coast of Europe in the same latitude, and especially that of the British islands. The effect of this amelioration from the prevalence of the southwest sea breeze is felt in winter, as has been here shown, as far east as Fort Union, on the Missouri, and has a constantly apparent effect on all the country east to Fort Benton.

The tables given in Vol. I show that the extremes both of summer and winter are from 5° to 10° less than in the interior, and that it as abundantly supplied with moisture as any part of the United States.

Later records tend to show that the average amount at Steilacoom and Vancouver has been over estimated, and from forty to forty-five inches annually would be nearer the truth. Most of it falls during the colder months, and two or three of the warmest are usually quite dry, thus favoring the gathering harvests. Some rain, however, falls during every month, especially west of the Coast range, and no complaint of drought can be made against the climate. From the greater coolness of the summers, Indian corn, except as a green vegetable, does not generally succeed, and perhaps a few other products of California may be found unprofitable. but for others, especially orchard fruits, that State is surpassed.

GENERAL CONCLUSIONS.

The favorable conclusions as to the climate of the country in the route of the expedition, stated in the first report, have been fully sustained by more recent observations.

As shown by the accounts of all who have traversed the Rocky mountains, during almost every winter month the snow there met with would not present the slightest impediment to the constant passage of railroad trains. And, in regard to temperature, the whole of these mountains between Fort Benton and Bitter Root valley, a distance in a straight line of 190 miles, have a milder winter climate than Wisconsin or Iowa, or any part of Nebraska east of the 100th meridian. A mean temperature of 20° to 25° must prevail throughout, excepting about five miles of the dividing ridge, which, rising 2,500 feet above the Bitter Root valley, and 3,400 above Fort Benton, will, by the rule already stated, fall to a mean of 16°; though from its very narrow extent, and the almost constant influence of the west winds, it must usually approach nearer the climate of Bitter Root valley, or have a mean of 19°.5. Even when crossed by Lieutenant Grover, while the cold northeast wind was blowing, we find that its temperature was more than a degree higher than it should have been when compared with Fort Benton.

From the increasing altitude and width of the Rocky mountain plateau, towards the south we find that the length of country, having a climate of similar coldness, must be much greater, as traversed by any line of railroad between this and that of the 35th parallel; while there, the distance from the mild winds of the Pacific coast, and the local influences of a much greater extent of snowy mountains, must still further decrease the mean winter temperature. The increased mildness of winter, due to a more southern latitude, is more than compensated by the greater altitude of any pass between the two routes; while the same fact is to be seen in relation to any interval of the same length (190 miles) traversed by the routes through those passes.

Of the relations of climate to the agricultural capacities of the country on the route, enough has been given to show that, while inferior to many parts of the United States in its adaptation for great variety of crops, it compares favorably with the best portions of the empire of Russia for the cultivation of the great staples of agriculture, and west of the Rocky mountains far surpasses them, approaching the most productive countries of Europe in character. Compared with any other route north of the 30th parallel, the climate is superior for agriculture. The natural growth of trees among the mountains, on this route alone, proves the superiority of climate over that of the elevated portions of the central Rocky mountains, where there is not sufficient moisture to sustain them, except at a higher elevation, varying from 5,000 to 8,000 feet. There is nothing in the soil of any portion, except the western part of the great plain of the Columbia, which forbids agriculture; and, allowing for mountains also, the distance traversed through lands, not cultivated continuously, will not exceed 320 as a maximum, most of which is grazing land, and contains patches of arable land sufficient for a stock-raising population, and for nuclei for mail and railroad stations.

RAILROAD REPORT AND ESTIMATE.

CHAPTER XVII.

St. Paul to Bois de Sioux.—Bois de Sioux to Fort Union.—Fort Union to crossing of Milk River.—Crossing of Milk River to Fort Benton.—Fort Benton to entrance to Tunnel, Cadotte's Pass.—Hell-Gate crossing, via Clark's Fork, to the Spokane.—Hell Gate crossing to crossing of Bitter Root.—Crossing of Bitter Root to entrance to Tunnel through the Cœur d'Aléne Mountains.—Tunnel at Stevens's Pass of the Cœur d'Aléne Mountains.—Tunnel to the Cœur d'Aléne Mission.—Cœur d'Aléne Mission to crossing of Columbia.—Crossing of the Columbia to Seattle, on Puget Sound.—To Vancouver, on the Columbia, and thence to Puget Sound.—Estimate of cost.

ST. PAUL TO BOIS DE SIOUX.

The Mississippi, at St. Paul, flows some hundred and fifty feet below the higher prairies east of the town. The ascent to this plateau is made with a forty foot grade; then, with little variation of surface or soil, the line follows the general direction of the river, passing over prairies or oak openings to Sauk Rapids, and thence to Little Falls, 112 miles. The same characteristics obtain to Crow Wing.

In this interval the soil generally consists of a vegetable mould, of from one to four feet in depth, resting on a gravelly or sandy substratum, affording the best material for a fine and dry road embankment. On the right, and further towards the interior, is the heavily wooded and timber country of Minnesota. No rock cutting was observed, though rock was found in places near St. Anthony's Falls, and in the vicinity of Sauk Rapids. The grades are light, seldom exceeding two feet per mile. The bridge crossings are, at Rice creek, 60 feet; Coon creek, 60 feet; Rum river, 150 feet; Elk river, 120 feet. The culvert masonry is small, and the earth-work will not exceed an average embankment of six feet. For structures both of wood and stone the material is good and near at hand. The crossing at Little Falls requires but 325 feet of bridge, in two stretches, the river being divided by an island. The river is crossed at right angles. The abutment rests on a rock, and being at the falls, the bridge presents no obstruction to navigation.

Here the crossing affords a good connexion with a line from Lake Superior, and on the west side enters a better wooded country than that further south, and one probably adapted for a firmer and drier road-bed.

Crow Wing has also great advantages for a connexion with Lake Superior, in the facility with which a bridge can be thrown across the river at that point, and the easy and very fertile character of the country, both eastward to Lake Superior and westward to the Bois de Sioux, in its inexhaustible timber, and in the saving of distance on the crossings to the south.

The crossings at St. Anthony's Falls and the Sauk Rapids are respectively of 800 and 600 feet, both feasible, and giving fair facilities.

In the next hundred and twenty-eight miles to the Bois de Sioux prairie the line passes successively through wooded and prairie country, the rise in this interval being about three hundred feet, the ground rolling, sometimes showing stony and gravelly knolls, and frequently interrupted by small lakes. The earth-work in this portion will not exceed an average

embankment of eight feet high, and is occasionally stony. Granite boulders, at occasional intervals, are scattered over the surface. Side ditching is often necessary in flat and low places, but for the main part of the distance the excavation is high and gravelly. There is no rock excavation. Grades of thirty feet per mile will occasionally be required in the limited region of knolly, rolling country, but will not generally exceed ten feet. Crossing the tributaries of the Minnesota at their sources, the amount of bridging will be small; an estimate of two hundred feet on the small streams of the Crow, South Branch, and Chippewa rivers covers the whole. The culverts will be frequent, but small. The pine and wooded region is estimated to extend on this line eighty miles westward from the Mississippi. From this the supplies of timber will be mostly drawn.

Stone is found in places only at the Mississippi. Granite boulders, which will supply culvert masonry, are found some sixty miles west of the Mississippi. For the small amounts of bridge abutments stone must be brought from the Mississippi, unless good materials are hereafter found more convenient.

The Bois de Sioux will require a bridge of one hundred and forty feet; thence forward to the Missouri the distance is 426.7 miles, and the total rise is about seven hundred feet. The first part of this is over the plateau of the Bois de Sioux.

BOIS DE SIOUX TO FORT UNION.

The line westward from the Bois de Sioux passes south of the Shyenne and avoids the difficult crossing of that river referred to in the narrative. In the breaking up of the winter, and with the spring rains, the plateau of the Bois de Sioux is undoubtedly very wet and marshy, and to a great extent covered by a small depth of standing water. The Wild Rice river, and a branch of it which also runs through this plain, will require bridges of one hundred and twenty and one hundred feet. From south of the Shyenne to Mouse river the country is nearly uniform, gradually rising, in part undulating, but frequently marshy, and with many small lakes. James river is crossed by a bridge one hundred and twenty feet in length. There is a general destitution of wood throughout this interval. The Bois de Sioux and Wild Rice rivers will furnish a small amount, and the Shyenne will supply sleepers for two hundred miles of the way, single track. We do not know that James river will furnish any, but wooded lakes occasionally aid in the supply. A supply can be procured from the Miniwakan lake. Mouse river is a large stream of water, and, after the Red River of the North, the most important on the route between the Mississippi and the Missouri. It flows in a deep, wide valley, upwards of two hundred feet below the prairie level, the bottom varying from a half mile to two miles; it is wooded, sometimes heavily, with elm, oak, ash, maple, &c. Its high and steep banks are cut up by deep coulées, extending back for fifteen or twenty miles. As these coulées would be difficult to cross, the railroad line is located so as to head them.

At Mouse river a coarse gray sandstone crops out, and near by, at the Maison du Chien, Mr. Lander reports an abundance of excellent building sandstone.

Mouse river is one hundred and twenty feet wide, and apparently as much as seven feet deep. The information collected as to its navigability was, from one source, that there was no obstruction; from another, that one rapid existed in the course down to its junction with Red river. This may be of great service in transporting materials, besides affording access to its beautiful and fertile valley.

Between Mouse river and Fort Union the route crossed the Plateau du Côteau du Missouri,

and though by keeping up the River of Lakes to its source, as recommended in the first report, a somewhat more level and uniform surface is found, with grades not exceeding forty feet per mile, the more direct route travelled by the main train offers no obstructions of consequence. The grading on this route will not exceed fifty feet. The line should strike some point on the Missouri, in the vicinity of the mouth of the Yellowstone, at the head of navigation for the large class of steamers which can run down the Missouri. This point will be in the general vicinity of Fort Union, and can be reached by the valley of the Little Muddy. At Mouse, Shyenne, Bois de Sioux, and Wild Rice rivers, but best at Red river, all the materials for good bricks are obtained, and it may be found cheaper and better to use brick masonry in the neighboring bridges and culverts, though the granite boulders will supply a considerable amount. Water can, by reservoir and unimportant aqueducts, be introduced at any point desired, and the numerous small lakes on the route will in this way be of service. Even through salt water regions fresh water ponds are more numerous than those that are brackish. Prairie fires should be provided for by ditching, and as the grass is not generally heavy this will prevent all danger to the road work and trains.

Besides the supply of wood on the rivers and on the Missouri, the road will require supplies to be transported from the forest near the Upper Mississippi. But without this it is estimated that the supply along the line is sufficient for six years. Coal exists in lower Minnesota and Iowa, and an inferior quality was also found on Mouse river.

FORT UNION TO CROSSING OF MILK RIVER

From Fort Union the line follows up the favorable valley of the Missouri to Milk river $105\frac{3}{10}$ miles, and then up the equally fine valley of Milk river for 180 miles further. The bottom lands of both are composed of clay and sand, of a nature to become soft and sloppy in wet weather, but parched and cracked during the dry season. This section does not offer the best, but will afford a fair material for road embankment. The tributary rivers on the north side, for which bridges must be erected, are the Great Muddy, Poplar, and Porcupine, all small streams, with an average width of sixty feet, the greatest depth where crossed, three feet. They will each require eighty feet trusses with two abutments.

There is, besides, one peculiar feature for which provision must be made in constructing a railroad. At short intervals, not over eight miles for the whole river-line, narrow canal-like channels are found, generally extending from the coulées of the bluffs, dry in summer, but in the spring freshets forming the sluices by which the surplus water runs into the river. These have an average width of twenty-five feet, with a depth of eight feet, and should be spanned with a single timber structure to prevent the accumulation of water which would take place if the embankment was filled in across them, and which would in time undermine it. Missouri river in the vicinity of Fort Union is about 450 yards wide, and up to Milk river has a valley from two to eight miles wide. Its banks are well wooded with cottonwood, and have a small quantity of red cedar. The hills on the south side are rough broken bluffs, from three hundred to five hundred feet high, and on the north side they also rise abruptly, but are low, the plain a few miles back being only from one to three hundred feet above the river. A coarse white sandstone crops out of the bluffs, but apparently will not be of use for building. Here the Yellowstone coming in will aid in supplying timber, and perhaps stone, from the Black Hills and other ranges wooded with pine, which occur some distance up near its course.

The lignite of this region, traced from the coulées of Mouse river to the headwaters of Milk, a distance of five hundred miles, apparently underlies this whole district, in a bed varying

from a few inches to six feet thick, and is a source of fuel not to be overlooked. Lime and sand are both to be obtained, and good materials for brick exist. In summer there is a scarcity of water, the small streams being dried up, but from the elevation of the plateau above the valley a good means is afforded for keeping up a supply, with the assistance of reservoirs, in those places at a distance from the main stream.

The rise in level along the Missouri is about one foot, and on Milk river about three feet per mile only.

The cottonwood of the Missouri will answer temporarily for railroad sleepers. The stockade built of it at Fort Union, which does not rest on the ground, is firm and sound, though built over twenty-five years ago. Milk river is crossed in a bend of the stream at right angles to the current, requiring a truss of about two hundred and forty feet, with an abutment twenty feet above the river bottom. The masonry should be protected by piling from the wash of the freshets.

CROSSING OF MILK RIVER TO FORT BENTON.

Milk river is crossed about two miles below the mouth of Box Elder creek, and the line passes up its general valley about thirty miles, when a choice of routes may be made. One route passes up a wooded tributary of the Box Elder, thence over a low divide to the Missouri, and follows up the Missouri on its northern bank to Fort Benton. The other ascends the plateau between the Box Elder and the Marias, on the general route of the main train in 1853, passes near the spring, descends into the valley of the Marias near its junction with the Teton, continues up the Teton to the point where it approaches within one hundred yards of the Missouri, then passes to the valley of the Missouri, and continues on the route before referred to to Fort Benton. The distance by the first route is eighty-one and one-half miles, and by the second seventy-five and five-tenths miles. The grades up to Box Elder will range from ten to twenty feet. The excavations and embankments will be quite moderate. The several streams, which are from five to ten miles apart, will require bridges of from fifty to seventy-five feet in length. There are also coulées which will require some culvert work. The valley of the Missouri should be struck at the mouth of the stream which flows from the springs, the distance from Box Elder creek to this point being twenty-one miles. About five miles from this point will be the summit of the divide, which, allowing for a cut of fifty feet, will have an elevation of 2,832.2 feet. The altitude of the Missouri is 2,558.5 feet, requiring a grade to meet the Missouri of 54.74 feet to the mile. From the Box Elder to the summit the grade will vary from 45.6 feet to 4.82 feet per mile. Most of this distance is a gently-rolling plateau, requiring but little excavations and embankments, but the first four miles from the Box Elder the grade will be 45.65 feet to the mile, with some heavy work. From the mouth of the creek to Fort Benton, a distance of thirty and one-half miles, the grades will be very gentle, not exceeding ten feet to the mile, the whole rise being but 221 feet. In that distance, to avoid sharp curvature, say less than two thousand feet radius, there will be heavy excavations in turning the points which project into the river. The river valley is wide, and will render it perfectly easy to waste earth without interfering with the channel of the river.

The altitude of Milk river is 2,388.8 feet, and of the Box Elder, at the point where the route leaves it, 2,691.7 feet. The other line referred to, passing over the plateau in four miles, makes a height of 2,924.3 feet, when it continues over a gently-rolling prairie for 26 miles to the point where the descent commences to the valley of the Marias, the highest point being in the vicinity

of the springs, and having an altitude of 2,982.2 feet. The descent to the Marias involves difficult and costly work, and must be made in 1½ mile along the foot-hills and up the stream, which should be crossed by a bridge 100 feet high, at an altitude of 2,782.9 feet; the altitude of the point whence the descent commences being 2,865.1 feet. The route then continues up the Teton 9½ miles to the Cracon du Nez, with a descending grade of 3.17 feet to the mile. The bluffs of the two sides of the Cracon du Nez are about 100 yards apart, the foot of the bluff in the Teton being 81.5 feet above the foot of the bluff on the Missouri. By commencing, however, a cut before reaching the bluffs, we reach the valley and commence going up the Missouri, with an embankment about 41 feet above the immediate line of the river, but which can be very much reduced by being adjusted along some foot slopes that line the valley. The descent can be made to the valley by a grade not exceeding forty feet to the mile, without heavy excavations or embankments. By either of these routes there will be no difficulty about supplies of water. The Box Elder, its several tributaries, the Missouri, the Marias, and the Teton, will furnish an unfailing supply. The longest distance without water will be on the plateau route, viz: from the Box Elder to the Marias, a distance of 31.5 miles; it is probable, however, that water can be procured by sinking wells near the springs. Either route can be easily supplied with all the materials for construction. The Bear's Paw, near by, as well as the country south of the Missouri, will furnish timber of all kinds. There is good limestone and sandstone in the vicinity of the route; sand for mortar and clay for bricks.

FORT BENTON TO ENTRANCE TO TUNNEL.—CADOTTE'S PASS.

Cadotte's Pass may be reached from Fort Benton either by keeping up the valley of the Missouri to the mouth of Sun river, thence up the Sun to a point nearly opposite the Rattlers, thence crossing the Sun between Crown Butte and the Rattlers, and continuing nearly on the course pursued by the main train, or the crossing of the Sun may be made by ascending the plateau from Fort Benton and passing by the springs and prairie lake referred to in the itinerary. The distance by this latter route from Fort Benton to the entrance to the tunnel of Cadotte's Pass will be one hundred and two and two-tenths miles. This is four miles longer than the trail pursued in 1853, for I have allowed two miles to make the descent into and the crossing of Sun river, and two miles for that of the Dearborn. The distance from Fort Benton to the crossing of Sun river will be 55½ miles; thence to the Dearborn thirty-six and seven-tenths miles; thence to the entrance to the tunnel ten miles. From Fort Benton to the springs the distance is sixteen and one-fourth miles, to the lake eighteen and a half, and thence to the Sun river twenty and three-fourths.

There will be no difficulty in adjusting grades over this distance not exceeding forty feet to the mile. The highest summit, at a distance this side of the prairie lake of seven and three-quarter miles, is three thousand eight hundred and thirty-six feet above the level of the sea. There is a summit five and a half miles beyond the prairie lake whose altitude is 3,702 feet above the sea. The altitude of the prairie lake is three thousand five hundred and fifty-eight feet. To adjust, however, a grade of forty feet, there will have to be cuts through the several summits, and excavations and embankments throughout the route. Sun river should be crossed with a bridge fifty feet above its valley, and the descent must be made with much care by side-hill locations, for in fifteen and three-fourths miles there will be a descent of three hundred and sixty-six feet. The Dearborn is crossed about a mile and a half above its junction with the stream flowing from Codotte's Pass with a bridge seventy feet above its immediate valley, and

at an elevation of four thousand three hundred and forty feet. There is a high ridge five and six-tenths miles beyond the crossing of Crown Butte creek, and twenty miles from Sun river, where a tunnel will be required a half mile in length. This ridge has an elevation of four thousand two hundred and thirty-five feet above the sea, and the summit level of the tunnel will be four thousand and seventy-two feet. The grade, on the supposition that it will be uniform from Sun river to the tunnel, will be forty-four feet per mile, but the work will be difficult, and it will not probably be found practicable to dispense with less than sixty feet grades.

From this tunnel to the Dearborn there will be a rise in the whole distance of two hundred and sixty-eight feet, giving grades, on the supposition that they are uniform, of sixteen and a half feet to the mile. From the crossing of the Dearborn to the entrance to the tunnel is a distance of ten miles, requiring grades of sixty feet to the mile. This work will be very costly and heavy, and require very careful side-hill location. Besides heavy excavations and embankments, there will be a great number of small bridges and culverts. The eastern debouche of the tunnel will be in the debouche of a ravine, described by me in the narrative of 1855, which gives a much better approach than the usually travelled trail. The tunnel will be 4.19 miles in length, when there will be a cut commencing fifty feet deep and coming out into the valley of the Blackfoot five hundred and fifty-eight thousandths of a mile west of the tunnel. The cut and the tunnel have a grade of sixty feet to the mile. The highest point of the road, therefore, will be at the entrance to the cut, at an elevation of five thousand one hundred and ninety-five feet above the sea, and eight hundred and forty-nine below the mountain summit. The entrance of the cut will be two and nine hundred and forty-eight thousandths miles west of the western base of the mountain, which is five hundred and sixty-seven feet higher than the eastern. This section, from Fort Benton to the entrance to the tunnel, is in the near vicinity of materials for construction; there is good building stone near the crossing of the Sun and Dearborn rivers and near the Crown Butte creek. The Teton, Sun, and Dearborn furnish sand and gravel as well as good cotton-wood. The Missouri and the mountains in the vicinity of the pass will furnish the yellow and pitch pine. Cadotte's pass can be reached more readily on this route than by going high up Sun river, crossing over to the Dearborn, and over the broken country lying between the Dearborn and the entrance to the pass.

The route by the Missouri to the crossing of Sun river will be easier in its grades than that over the plateau, but it will be heavier work of excavation and embankment. There are many sharp points running down to the Missouri which must be dealt with in the same manner as the similar places which occur below Fort Benton. The distance will be sixty-three miles, or seven and a half miles further than the route over the plateau. There will be advantages, however, on the line of the Missouri in the unfailing supply of pure water, and its greater accessibility to all the materials of construction.

To reach Lewis and Clark's Pass, either of these routes may be taken to Sun river, when we continue up Sun river and its Elk or south tributary, a distance of forty-eight miles, or ten miles above the forks. The valley of the Sun river and that portion of the Elk Fork is very easy for railroad construction, and the grades will vary from 43.5 feet to 5.03 feet per mile.

Starting from Fort Benton we make a rise in eleven and a half, twenty-five, sixteen, twenty-two, fifteen, ten and a half miles, respectively, eighty-three, one hundred and sixteen, four hundred and ninety-five, one hundred and eighteen, one hundred and ninety-seven, three hundred and twenty-five and one-tenth feet, giving the respective gradients of seven and

twenty-one hundredths, four and sixty-four hundredths, thirty and nine-tenths, five and thirty-five hundredths thirteen and one-tenth, thirty and nine-tenths, forty-five and six-tenths feet to the mile. At the great falls of the Missouri, where in fifteen miles there is a fall of 357 feet, the grades must be adjusted with great care at the expense of heavy work. For ten miles above the forks of Sun river the grades will vary from forty to fifty feet per mile. The work of excavation and embankment will be light. Thence to the tunnel of Lewis and Clark's Pass is nineteen and one hundred and twenty-one thousandths (19.121) miles, all very difficult and heavy work. The tunnel itself is two and one hundred and twenty-nine thousandths (2.129) miles in length. The summit level of the tunnel is at a debouche a half mile west of the western base of the mountain, and is 5,698.6 feet above the level of the sea. It passes out on a descending grade of sixty feet to the mile, at an elevation of 5,570.86 feet above the sea, the summit level of the mountain being 6,519.3 feet above the sea. As in Cadotte's Pass, the eastern approach is by a ravine north of the travelled trail. In ten miles above the forks the line leaves the general valley of the Elk Fork, crossing the highest summit about halfway between the route of the party of 1855 and Heart mountain, and crosses Dearborn river at an elevation of 4,994 feet above the sea, and about one mile above the trail. The country is lower and less broken by this route than in any other part of the plateau between the upper waters of the Sun and Dearborn rivers. The Dearborn itself leaves the mountains by a gap in a direction nearly east, when it turns suddenly to the south, and continuing on three miles, it turns suddenly again to the east to the point where it crosses the trail. The railroad line follows along the Dearborn on this south line three miles, and makes the crossing just below its last turn to the east. A bridge, one mile in length and nearly 300 feet above the valley, which at this point has an elevation of about 4,700 feet above the sea, will be required to cross the Dearborn. Thence for two miles and three-eighths the road will follow very nearly the natural grade, varying from forty to sixty feet to the mile. In two miles and three-quarters further we come to a ravine, in which flows a stream of water which can only be turned by continuing up the ravine and keeping closely along the side hills. Between this point and the entrance to the tunnel, a distance of 4¾ miles, there will be seven small streams to cross, involving the adjustment of a grade of sixty feet to the mile, the necessity of constant curvatures with radii of 1,500 or 2,000 feet. There will be very heavy embankments required to cross these several streams, which can, however, be made up from the adjacent spurs with hauls exceeding in no case a half mile. Moreover, the ravine, into which the tunnel debouches on the east, by the best system of side-hill approach, must be filled up, which can be done by the debris from the tunnel. The country at right angles to the line of the road rises towards the mountains at a grade of from one-fourth to one-eighth. This is equally the case with the ravines in which the streams flow and the intermediate divides. Debouching from the tunnel on the western side, the line continues in the valley of the stream for five miles at a grade of thirty-five feet, with an excavation and embankment almost entirely along the natural surface; and for a mile and a half further at a grade of forty-four feet to the mile, when we leave the stream, and, making a cut through a low divide of about 700 feet in length, come upon a gently sloping prairie, down which it can be laid and brought into the valley of the Big Blackfoot through the open valley of a small stream at a grade of from sixty to sixty-five feet to the mile. This grade will involve closely hugging the side hills which line the valley of the small stream and the Big Blackfoot on the west, and will involve a curve of the minimum radius. The greatest depth of the cut will be 134.7 feet. For the first 80 feet the cut will be from 134.7 feet to 122.6 feet in depth,

and for the next 500 feet from 122.6 to 38.8 in depth; then in 100 feet the cut reduces to 31.4 in depth, and in 1,000 feet further to 20.8 feet in depth, and it runs out in 200 feet further.

To resume the line down the Blackfoot from Cadotte's Pass. From the summit level, at the entrance to the tunnel, the line continues down the valley for six and twenty-eight-thousandths miles, when it is joined by the line from Lewis and Clark's Pass. Three-fourths of a mile before reaching this point it crosses the stream flowing from the pass. Continuing for four and one-fourth miles further, it crosses Lander's Fork. A considerable bridge will be required here, consisting of a single arch of two hundred feet; excavations and embankments will average from fifteen to sixteen feet. It then continues down the valley, which has been gradually widening from the pass for nine miles, when it reaches what is known as the Cañon. In this distance two streams are crossed, coming from the north. This distance is in the prairie known as the Belly. The work here will be very moderate, the excavations and embankments small. The Cañon is a low open valley, in no case less than one-third of a mile in width, and widening out two or three miles. Excavations and embankments are moderate. The country is mostly wooded. Seven miles from the entrance to the Cañon we come to a prairie of one thousand acres, which is overflowed at high water, and against which special precautions will have to be made. Only one stream of any consequence is crossed, about three miles before issuing from the Cañon. Leaving the Cañon we come into the large prairie which has been particularly described in the narrative. At this point the Blackfoot will have to be crossed twice in a distance of a mile and a half. The distance across the prairie is thirty-four and six-tenth miles, and the line can be laid in nearly a straight course by adapting the grade to the ground, at the expense of heavy excavations and embankments. In about eight and a half miles Salmon Trout creek is crossed, requiring a bridge and careful adjustment of the line. In ten and a half miles further another large stream is crossed, and in the remaining distance two or three small streams will have to be bridged; and seven miles before reaching the end of the prairie a cut must be made through a low ridge.

We have now come to the lower cañon of the Big Blackfoot. This cañon is nineteen miles long, and is perfectly practicable. The river must be crossed frequently, not, probably, less than thirteen times, and, to avoid short curvatures, there must be heavy excavations, mostly in rock. Embankments will be moderate. There will be no difficulty in wasting earth. Occasionally sustaining walls must be resorted to. In the narrative reference has been made to the prairies opposite projecting points, and in locating the railroad line care must be taken to pass from prairie to prairie.

In six miles further we come out of the valley of Hell-Gate into the general valley of the Bitter Root, at a place known as the Hell-Gate Ronde. Here a trail crosses the Hell-Gate to Fort Owen. This point, in the estimate, has been called the crossing of Hell-Gate.

In this section of ninety-one and sixty-eight hundredths miles from the tunnel there will be ample materials for construction of all kinds; timber for all purposes of construction inexhaustible; ample supplies of water, gravel, and sand are found at convenient points. There are many localities of good building stone. Slate is to be found at the mouth of Salmon Trout creek, and limestone, suitable for walls of all kinds, in the lower cañon.

The whole descent in this distance is 1,735.8 feet, or an average grade of 18.94 feet to the mile. The several grades as shown on the profile, on the supposition of uniform grades for the several distances will vary from 63 feet to 3.1 feet to the mile. But it will be found advisable, to diminish excavations and embankments, not to use as low grades as three and

one-tenth feet to the mile; though, without large excavations and embankments and proper side-hill location, there will be no necessity of using grades greater than fifty feet to the mile. It is probable that a better line can be found by turning to the south seven miles before reaching the western end of the prairie, crossing the Big Blackfoot, passing through the extensive Kamas prairie on its southern side, and returning to the immediate valley of the river, six miles before reaching the end of the cañon. There will be no difficulty from freshets in this section. The prairies are not overflowed in high water, except small portions of the Belly prairie, and the greatest rise and fall of the Big Blackfoot will be about six feet.

Before describing further the railroad line, I will briefly state the characteristics of the route of 1853 down Clark's Fork.

HELL-GATE CROSSING, VIA CLARK'S FORK, TO THE SPOKANE.

The route is the same with the route of 1855 for seven and a half miles below the Hell-Gate crossing, when it follows the northern foot slope of the Hell-Gate Ronde and passes over the summit which lays between it and the Flathead river, with a gradient of thirty-five feet per mile, or, allowing for errors in the barometer, of forty feet. Having attained this summit, it strikes a tributary of the Jocko, and descending along that stream to the valley of the Flathead, the gradient being forty feet (assumed at fifty) down the tributary of the Jocko, and down the main streams as well as down the Flathead to its junction with the Bitter Root, twenty feet. By the barometer the average fall of Clark's Fork is about eleven feet per mile. The road is estimated to descend at gradients of from fifteen to twenty feet per mile. After leaving the Jocko the road should follow the hills on the left side of the Flathead, to a point some miles above its junction with the Bitter Root. Then crossing, it would follow the right bank of Clark's Fork as far as Big Rock. Here it would cross, and following down the left bank, would recross at the Cabinet. Then tunnelling the Cabinet mountain three hundred yards, it would continue on the right of the river to Lake Pend d'Oreille, and on the northern side of that lake to its lower extremity. Both along Clark's Fork and the lake fifteen feet is about the difference of high and low water mark, and the road must therefore keep the sides of the hills, in some instances requiring high embankments. The tunnel at the Cabinet mountain would be through a formation of which fifty per cent. is rock, this being basaltic trap. The transit from Clark's Fork to the Spokane could be made with gradients of not more than twenty-five feet. It might be facilitated by making use of the valley of a small stream which empties into Clark's Fork about twelve miles below the lake, and by a valley seen ten miles west of Clark's Fork, which appears to make into Cœur d'Aléne prairie. A bridge half a mile long would be required to cross Pack river. Excellent timber and good stone are found along the whole of this distance. The crossing of the Spokane will involve heavy work of bridging, excavation, and embankments, but beyond, over the Great Plain of the Columbia, there are many practicable lines. But to resume.

HELL-GATE CROSSING TO CROSSING OF BITTER ROOT—DISTANCE 65 MILES.

Hell-Gate crossing is about three thousand and three hundred and fifty-nine feet above the sea. The line for ten miles and a half crosses diagonally the Hell-Gate Ronde. There are several small streams and swales in this distance. Excavations and embankments moderate; grade 30.5 feet to the mile. Here a stream is crossed, and continuing down on the east side of the Bitter Root for sixteen miles through, for nearly the entire distance, a wide, open valley,

the Bitter Root is crossed. The line follows the west side of the Bitter Root over a broad and extensive prairie, partially wooded, when it recrosses the Bitter Root; and continuing on its east side for thirty-one miles, crosses it for the third time just above the mouth of the St. Regis de Borgia. In the above distance of sixteen miles before making the first crossing of the Bitter Root, the work of excavation and embankment will be very light for about six miles, when a deep cut must be made through a ridge in rock In three-quarters of a mile there is a deep re-entering of the river; a sort of delta formed by two streams three-fourths of a mile apart. An embankment forty feet high and two bridges will be required to cross this place, and there will be curvature at both extremities of the embankment. Before reaching the crossing there will be a considerable rock excavation. The total descent in this distance is 1,465.3 feet, giving a grade of 22.5 feet to the mile. To avoid excessive excavations and embankments, grades of forty feet should be adjusted to the ground, and considerable curvatures must be allowed.

The point of crossing the river is at a turn where a bridge two hundred feet long can be thrown nearly at right angles with the course of the stream without involving excessive curvature. The banks are only about fifteen feet high. Suitable building stone can be obtained in the immediate vicinity. After crossing, the line follows the next bank over a low plateau under a side hill for about one mile and a quarter, when it comes round a point of rocks involving a very heavy excavation, almost exclusively in rock, and there will be a very heavy excavation in rock for a mile and a half further. Then a marsh has to be crossed, requiring an embankment of twenty feet. The remaining four and a half miles before re-crossing the river over the partially wooded plateau referred to will also require, in places, large excavations and embankment. The plateau rises in terraces of from ten to twenty feet in height, and some curvature will be necessary, and an undulating grade, not, however, exceeding thirty feet to the mile. The second crossing is of the same character as the first. About the same length of bridge and the same direction in reference to the course of the stream. The banks are forty feet high. The fall in this distance of seven and a half miles is 8.63 feet, and the average grade 1.75 feet. Continuing over on the east side of the Bitter Root the line follows for eight miles near to or along the immediate banks of the river, at from forty to eighty feet above the water level; or the same point could be reached by the line leaving the river in two and a half miles and crossing in one mile a low point in a spur which runs in a northwest and southeast direction, involving a short tunnel or deep cut of about five hundred yards. The first mode is preferable. For five eighths of a mile further the line will run along the water's edge, there being the whole distance a steep ridge of rocks with broken stone at the base and partially up the slope. Trees are, however, growing out of the fissures of the rocks. Care must be taken to adjust curvature in this distance, and at two places the line must be built in the water. It will not interfere with the water way. For three and one-eighth miles further the line follows the plateau; two streams in this distance requiring inconsiderable bridges. This plateau is thirty to seventy feet above the river. Then one-eighth of a mile side-hill work; curvature fifteen hundred feet.

Then comes a beautiful partially wooded prairie for four and one-fourth miles. Excavations and embankments moderate. There will be a half a mile of side-hill work during the next two miles. We then cross a fine mountain stream and come to a plateau again for three and three-fourth miles, with terraces as described in the plateau on the west bank of the river, and situated in a large re-entering. For one-half mile some side cutting, when a stream is crossed; and continuing up a plateau about thirty feet above the water level of the river for half a mile, we

come to high, steep bluffs stretching along the river for three hundred and fifty yards. The banks for this distance are liable to slide, and it is the only point of the line on this division where slides are liable to occur; for the fixed regimen of all the other banks and side hills is shown by the forest growth on their sides. These bluffs can be passed by a bridge of a single arch, resting on abutments on the fixed river banks at the end of the bluffs, and running along the river sides. If a slide occurs, it will pass under the arch of the bridge. The next two miles is along a plateau ten to twenty feet above the water level, with but moderate excavations and embankments, when two spurs have to be passed not involving heavy work, and requiring, to pass to the plateau beyond, some curvature and side cutting. Then for three and five-eighths miles the line with but little curvature can be easily located, when for one-eighth of a mile side-hill work will be required, when we come to a prairie which extends along the line for three-eighths of a mile, when a sharp point comes down that will require a deep cut or a short tunnel. For three-eighths of a mile side cutting, and for one and a half mile a plateau eight to ten feet above the water level, when the river has to be crossed again. The whole fall from the second to the third crossing of the river is 20 feet. The line at the crossing of the Bitter Root, above the mouth of the St. Regis de Borgia, is two thousand eight hundred and ninety-three and one-tenth feet above the sea.

The materials for construction down the Bitter Root are very abundant. There will be no practical difficulty in procuring building stone. There are many navigable reaches of the river for boats and scows. Stone can easily be transported by the river to the point where it may be needed. I am satisfied good building stone is to be found at many points on the river and in the adjacent country. The bridge could, if necessary, be built of the timber of the country. The third crossing of the Bitter Root will be by a bridge one hundred and fifty yards long. Banks, gravel on both sides, one to three feet above the highest water. Greatest rise and fall of the river, eight feet. The work on this section will be very much less than was stated in the report of the explorations of 1853. It was more carefully examined in 1855.

CROSSING OF BITTER ROOT TO ENTRANCE TO TUNNEL THROUGH THE CŒUR D'ALÉNE MOUNTAINS—DISTANCE 35 MILES.

In this distance the line rises one thousand and ninety-six and ninety-three hundredths feet, reaching an elevation of three thousand nine hundred and ninety and three hundredths feet above the sea, and giving an average gradient of thirty-one and four-tenths feet to the mile. The gradients in the immediate valley of the river are as follows, on this distance: twelve and one-fourth miles, thirteen and three tenths feet to the mile; three and three-fourths miles, six and seven-tenths feet per mile; two and a half miles, forty-three and five-tenths feet to the mile; seven miles, thirty-three and six-tenths feet to the mile; two and one-half miles, natural grade of the surface sixty-nine and six-tenths feet per mile, to which sixty feet grades can be adjusted; two and three-fourths miles, twelve and eight-tenths feet to the mile; one mile, seven and six-tenths feet; and three and one-fourth miles, the natural surface is one hundred and eight feet to the mile. Sixty foot gradients can be adjusted on this distance by careful side-hill location, minimum curvatures, and heavy excavations and embankments; and this will be the character of the work for this grade for the last five miles of the St. Regis de Borgia section before entering the tunnel, with this exception, there will not be excessive excavations and embankments on this section. To avoid excessive curvature, the points in turns of the river will have to be sternly dealt with. Nor will there be much rock cutting. There will, however, be a great amount of bridging—some considerable structures—as the river must be crossed

obliquely. A single arch will always be sufficient. It will sometimes be necessary to resort to side walls. The trail crosses the river forty-four times. The number of bridges will be much less; several tributary streams to be bridged; much culvert work; road-bed to be well raised. The valley is not subject to overflow; its banks are four to twelve feet above water-level, several places covered with water at its highest stage. Greatest rise and fall near the mouth of the St. Regis de Borgia, about five and a half feet; sixteen miles higher up, four feet. There will be considerable wood to cut through, and much gravelling. The wood will generally be a small growth in the river bottoms. The materials for construction will be literally inexhaustible. Good limestone was observed at several points, especially about midway of the section.

TUNNEL AT STEVENS'S PASS OF THE CŒUR D'ALÉNE MOUNTAINS.

This tunnel will be 1¾ miles, in easily worked limestone and earth. It passes from the Cœur d'Aléne to the St. Regis de Borgia in a south by east course, making nearly a right angle with the general course of the road. The summit is at the eastern debouche, at an elevation of 3,990.03 feet above the sea. It descends to the west at a gradient of sixty feet to the mile, and its elevation on the western extremity is 3,877.7 feet above the sea. The summit level of the divide on the usually travelled trail is 5,089.7 feet.

TUNNEL TO CŒUR D'ALÉNE MISSION—DISTANCE 48½ MILES.

In this distance the line falls 1,586.9 feet to an elevation of 2,290.8 feet above the sea, and giving an average gradient of 32.74 feet to the mile. The grades along the immediate valley of the river are as follows:

¼th	mile,	94.8	feet to the mile.
1	do	101.1	do.
½	do	131.8	do.
½	do	131.4	do.
¼	do	4.3	do.
1	do	79.2	do.
3½	do	66.2	do.
3½	do	56.1	do.
8	do	28.	do.
6	do	60.6	do.
5	do	38.34	do.
8	do	1.17	do.
11	do	3.6	do.

48½ miles, fall 1,586.9, grade 32.74 feet to the mile.

For the first 10½ miles from the tunnel the road must be very carefully located along the side hills, north of the river, to use sixty feet gradients. The side hills run gently to the river. There is a narrow open valley for 2½ miles to the point where the trail crosses the river to pass over the divide, and for 4½ miles further the route is through wood, sometimes of small growth. In this distance three streams are crossed. The next nine miles will require great care in location. The trail passes over low side hills north of the river, and in some cases a mile from

it; and these side hills come well down to the river, in some cases with a steep slope. The excavations and embankments will be large, and in some cases sustaining walls will be required. Four streams, and several places where water runs in the spring, occur in this distance. Crossing then a low place for three-fourths of a mile there are two slues. The road passes through a very heavy growth of cedar, and in one-fourth of a mile reaches the point of junction with the trail over the mountain to the south of the Cœur d'Aléne river. Here a stream comes in from the south. In the next six miles the Cœur d'Aléne is crossed on the trail six times, but the road can be located without crossing the river more than half that number of times. Thus far, except in the low place and forest of cedar referred to, the river does not overflow its banks. The next thirteen miles the river is crossed sixteen times on the trail, nine of which are within the distance of 2½ miles, and in the remaining eleven miles it is crossed but twice. In these two last distances of twenty-four miles there are distances where the road will pass over wet and marshy places. There will be some, though not excessive, rock cutting. The whole section, from the tunnel to the Mission, will have a large amount of bridge and culvert work. The bridges will none of them be difficult or costly structures, but frequently they must run quite obliquely to the course of the river to avoid short curvature. The bridges may be wooden structures. Piles could be used in passing some of the wet places. The mountain pine in the vicinity will furnish abundant material for this and all other purposes of construction. There is good building stone at several localities, limestone up the stream, and slate lower down; gravel, sand, and clay occur at convenient points. The highest rise and fall of the river is four feet.

CŒUR D'ALÉNE MISSION TO CROSSING OF COLUMBIA—DISTANCE 181¾ MILES.

The line keeps north of the Cœur d'Aléne river and lake, and crossing the Spokane, or, more properly speaking, Cœur d'Aléne, near the eastern edge of the Cœur d'Aléne prairie, passes in nearly a straight direction to the main Columbia, near but above the mouth of the Yakima. The line could keep still further down the Cœur d'Aléne and Spokane to a junction with the railroad line reported practicable as the result of the explorations of 1853'–54. The course laid down on the map and described above is unquestionably practicable, the whole country having been under view; but great care will be required to locate a crossing of the river, and to gain the plateau beyond; for there are spurs running down from the south to the Cœur d'Aléne river and lake which have to be turned. The line is located on the map at the foot of three spurs. But between the river and the Kamas Prairie creek, there is a divide which will have to be surmounted, and corresponding to the ridges found in other parts of the Great Plain. The distance from the Mission to the crossing of the Cœur d'Aléne is twenty-seven miles. There will be much heavy work on this distance—considerable curvature and some rock excavation. The route, after leaving the Mission two miles, will pass through a rolling and wooded country, interspersed with prairies for about eighty miles. The remaining distance to the Columbia is destitute of timber—a distance of about one hundred miles. Except for this portion, timber, wood, building stone, sand, clay, and gravel abound for purposes of construction. For the portion destitute of timber the supply must come from the extremities. The upper Columbia will furnish an inexhaustible supply. There is no danger of a deficiency of water, as there are many streams and lakes along the route.

The fall from the Cœur d'Aléne Mission to the crossing of the Spokane is about 198 feet in thirty miles, giving an aggregate grade of 6⅗ feet to the mile; and from the crossing of the

Spokane to the crossing of the Columbia 1,598 feet in 151¾ miles, or an aggregate gradient of 10½ feet to the mile. But there will be several summits in this distance, and a maximum summit of about 2,600 feet above the sea. It is not probable that gradients exceeding forty or fifty feet to the mile will be required along this distance.

CROSSING OF THE COLUMBIA TO SEATTLE, ON PUGET SOUND—DISTANCE 220 MILES.

The Columbia river, for fifteen miles above the mouth of the Yakima, is 400 yards wide, with sand and gravel banks thirty feet high.

The railroad line passes up the valley of the main Yakima to the Snoqualmoo Pass, where there are two routes for tunnelling through the divide—one being by a route south, and the other by a route north of Lake Kitchelus. The first brings the line to the valley of the Nooknoo or Cedar creek, which can be followed down to its junction with the stream flowing from the Dwamish lake to the Dwamish river, near the outlet of the lake. The line then runs in nearly a straight course to Seattle; or, following down the Nooknoo twenty-nine miles and a half, the line may take the summit and northern slope of the low ridge separating Lake Mowee from the valley of the Snoqualmoo, and from that, taking a spur running from the Nooknoo falls to those of the Snoqualmoo, reach the latter falls at a distance of forty-five miles from the tunnel. Thence the distance to Seattle is thirty miles, and the grades do not exceed twenty feet. The route north of Lake Kitchelus comes immediately upon the waters of Snoqualmoo; and although no observations have been taken for altitude, intelligent gentlemen who have been over both routes state that it is lower, and involves less tunnelling than the route south of Lake Kitchelus. There are two modes of piercing the mountain south of Lake Kitchelus: first, by means of a tunnel four thousand yards in length from the level of Lake Willailootzas, two thousand nine hundred and ninety-three feet above Vancouver; second, by a tunnel eleven thousand eight hundred and forty yards long, from the level of Lake Kitchelus, two thousand three hundred and eighty-eight feet above Vancouver. The average grade to the Snoqualmoo falls, with the use of the long tunnel, will be forty-six and three-tenths feet per mile, and with the use of the short tunnel, fifty-nine and eight-tenths feet per mile.

The ascent up the valley of the Yakima is as follows:

From the crossing of the Columbia to the commencement of the pine timber is a distance of ninety-six miles. The general character of the valley to this point is wide, open, and terraced; the ground of sand, gravel, or loose stones; but little clay or vegetable mould; curves easy; long stretches of straight road perfectly practicable. In this distance there are five points where the hills come close to the river, making, at most, ten miles of side-cutting necessary. This cutting is generally in earth, loose stone, or trap rock, easily broken into blocks. In addition to these five points, the last eight miles of the ninety-six will be principally side-cutting in earth, gravel, and sand; the work light, and no very high slopes. In the first eighty miles from the Columbia the grade will be 12½ feet to the mile; in the last sixteen miles it will be 8½ feet to the mile. By keeping thus far the north bank of the Yakima, the only bridges of any consequence will be two, over streams each about seventy-five feet in width.

At some place in this vicinity it would be advisable to cross to the south bank of the Yakima, which is here about forty yards wide; good crossing easily found; plenty of timber on the spot; stone for masonry within twenty-five miles by water. The road now keeps to the valley twenty-one miles further on, four miles beyond Ksitkas, passing through an open pine woods; soil light, sometimes gravelly; about two miles side cutting; grade eight feet to the mile.

If the short tunnel be used, the road at this point must leave the valley, take a side location on the northern slope of the mountains bordering the valley on the south, and ascend eight hundred and ninety-five feet in eighteen and a half miles, giving a gradient of $48\frac{4}{10}$ feet per mile, in fifty per cent. rock. The plateau of Willailootzas, one mile long, will be entered by a curve, with a radius of about two thousand feet, and the road pass along the north bank of the lake, with side location in eighty per cent. trap rock, easily worked. This lake should be partially drained; its shores are steep and of broken stone. There will be some little difficulty in preparing a proper depot for the workmen, tools, &c., at the entrance of the tunnel; or, if the long tunnel be used, then, commencing at the point eighteen and a half miles east of Willailootzas, there will be eighteen and a half miles, with a gradient of $15\frac{2}{10}$ feet per mile, and with but little side cutting, through a thickly timbered country as far as Kitchelus.

Both tunnels will pass through solid rock, (silicious conglomerate,) and there will be cutting through rock of similar character on the mountain spur bordering the valley of the Nooknoo. Yellow pine grows abundantly on the Yakima ninety-six miles from its mouth, and can be rafted down at high water. Granite can be brought down from a point about one hundred and forty miles above the mouth of the Yakima, and good sandstone and limestone are to be found on Puget Sound. The question of snow has been sufficiently considered in the meteorological paper.

Seattle is an admirable harbor for a great railroad depot, being land-locked, defensible, accessible, and commodious. The harbor at the entrance of the Snoqualmoo, or, as it is named in the lower part of its course, the Snohomish river, has mud flats, with a good harbor between the flats and Point Elliott to the south. The suggestion is whether the line may not follow down the Snoqualmoo on its north bend, cross over to Whidby's island, and the depot be established on its western shore, nearly opposite Port Townsend. This will require works of the largest and most expensive character; for an artificial harbor must be made, by a breakwater midway between the island and the opposite shore. When it is recollected that with such a breakwater—for such a form and position can be given to it as that a heavy battery, with a keeper's tower can be planted on it—the extensive waters of the sound could be defended by a single system of works at Port Townsend, the suggestion may not be altogether without significance. A small work would be, of course, required at Deception Passage.

BRANCH ROAD DOWN THE COLUMBIA TO VANCOUVER, AND EXTENSION, VIA LINE OF COWLITZ, TO PUGET SOUND.

On the map I have exhibited this branch as leaving the main trunk twenty miles before reaching the Columbia. This is not done as giving a location, but simply for convenience of reference. There should, if practicable, be but one bridge crossing by the Columbia for the two branches, supposing the branch down the Columbia should keep along its south bank, as minute surveys can determine the particular details. On the north side of the river the party of Mr. Tinkham found it necessary in only two instances to cross the rocky spurs which jut out from the river bluffs. The Columbia River Pass is not only undoubtedly practicable, but is remarkably favorable. The only tunnel required will be to effect the passage around Cape Horn mountain; this will not exceed seven hundred feet in length, and a close examination may prove even this to be unnecessary. There need be no gradient to exceed ten feet per mile, but considerable side cutting in the rock will be necessary. The high floods to which the river is subject are the most serious obstacles to obtaining the advantages of cheap construction offered by its valley; to avoid these it will be necessary to run the road at some distance above the water;

but as much of the slope consists in debris, workable with the shovel, embankments will be easily made, and when constructed will be of the most durable kind.

At eastern prices this work might be done at fifty cents per cubic yard. The tunnel through Cape Horn mountain would cost, at eastern prices, say, sixty-five dollars per lineal foot, a high estimate, considering the character of the road. The easy access to this part of the route will make it cheaper of construction than parts of the same character further in the interior.

The bluffs along the Columbia cease near Cape Horn, and passing through a level bottom land, partly wooded, as far as the Cowlitz, it turns northward from the Columbia, and follows the wide Cowlitz valley, with an easy ascent, to the prairies occupying about half of the country on the line from thence to Puget Sound. Along the eastern shore of Puget Sound, from Steilacoom to Seattle, it passes through dense forests for most of the way, and crosses several large streams, which will probably make a terminus higher up the sound desirable for a route approaching by way of the Columbia. Good building stone, excellent timber, and abundant water is found on this part of the route, while fine gravel, constituting the soil through most of the way, offers a superior material for the road-bed. But Lieutenant Mullan reports that, by his Wagon Pass, a railroad line can be laid across the Rocky mountains with only a cut one hundred feet deep through the divide, which is but half a measured mile from base to base, and that no excessive gradients will be required on the eastern approach. The descent down the valley of the Little Blackfoot and Hell-Gate is exceedingly favorable. Thus a line can be laid down from the Mississippi to Olympia, on Puget Sound, with but short and few tunnels, but which will be two hundred and seventy-six miles longer than the route by Cadotte's, the Cœur d'Aléne, and the Snoqualmoo Passes to Seattle. We cross the Rocky mountains by the northern Little Blackfoot or Mullan's Pass, then follow down the Little Blackfoot and Hell-Gate valleys, cross over the Jocko divide to Hell-Gate, follow down Clark's Fork to below the Pend d'Oreille lake, cross over to the Spokane, and, finally, after passing over the great plain of the Columbia, follow down the Columbia valley to near the mouth of the Cowlitz, and reach the sound by the easy and practicable line of the Cowlitz and intermediate country. If, instead of a cut of half a mile through Mullan's Pass, this distance should have to be tunnelled, the only remaining tunnels will be at the Cabinet, three hundred yards in length, fifty per cent. in basaltic trap, and Cape Horn, seven hundred feet in length. By this route the distance to Olympia from St. Paul will be two thousand and forty miles, against one thousand seven hundred and sixty-four miles, the distance to Seattle by the route of the tunnels.

The distance to Seattle by the no tunnel route will be 2,092 miles.

By the tunnel route the elevation above the sea is as follows:

BRECKINRIDGE TO SEATTLE.

Number of miles at an elevation above 0 and less than 1,000 feet	130 miles.
Number of miles at an elevation above 1,000 and less than 2,000 feet	433 "
Do ..... do ..... 2,000 ..... do ..... 3,000 feet	733 "
Do ..... do ..... 3,000 ..... do ..... 4,000 feet	180 "
Do ..... do ..... 4,000 ..... do ..... 5,000 feet	62 "
Do ..... do ..... 5,000 and above	6 "

Summit level, 6,046.

Tunnel at an elevation of 5,161.52.

On the route from Breckinridge to Vancouver the distances and elevations are as follows:

Below 1,000 feet below the sea	243 miles.
Between 1,000 and 2,000 feet below the sea	391 "
Between 2,000 and 3,000 feet below the sea	648 "
Between 3,000 and 4,000 feet below the sea	178 "
Between 4,000 and 5,000 feet above the sea	61 "
5,000 feet or more above the sea	6 "

The sum of ascents and descents from Breckinridge to Seattle are 21,787 feet, and to Vancouver 17,587.

Equated distances from Breckinridge to Seattle *via* Cadotte's Pass, 1,957.14.

Equated distances from Breckinridge to Vancouver *via* Cadotte's Pass, 1,859.69.

There is only 320 miles of uncultivable country along the line of the route.

Before giving the estimate I will state that there are many advantages in bringing the line to the Mission rather than taking it from Milk river and crossing the Marias and Teton high up towards the mountains, as recommended in my report of 1854. The cost is diminished thereby; the road is brought at once directly to the head of navigation of the Missouri; it dispenses with the necessity and expense of a spur road; it renders unnecessary the reservoir for water at Grizzly Bear lake; there will be the most ample supply of water along the line of the route about to be estimated upon; Box Elder, Sun river, Elk Fork, the Dearborn, the several tributaries of the Dearborn, and the creeks flowing westward from the divides of Cadotte, and Lewis and Clark, will, as well as the Mission, furnish an inexhaustible supply of the purest water; it will bring the whole of this portion of the route into the close vicinity of a well-wooded region; it will effect a great saving in transportation; it will be near water power; it will hasten by six months the completion of this portion of the road; the old location, from Sun river to the Dearborn, will involve exceedingly heavy excavations and embankments.

ESTIMATE OF COST.

The estimate of cost of road is not given for the distance east from Breckinridge on the western boundary of Minnesota, to which point the Minnesota and Pacific Railroad Company have located a road under the recent grants of Congress. Their route crosses the Mississippi near the Falls of St. Anthony, does not deflect more than 27 miles at any point from an air line, and saves 20 miles in distance over my surveyed routes. Moreover, with means at hand, it can be built for less than my estimate of $25,000 per mile, viz: for about $21,000 or $22,000 per mile.

An estimate is given of the cost of the road from Breckinridge to Seattle and Vancouver, both by Cadotte's and Lewis and Clark's Passes. First, by passing the plateau generally, and the route of the main train, and second by the Missouri Great Falls and Sun river, as explained in this paper.

Estimate of cost of road from Breckinridge to Seattle, via Fort Union, Fort Benton, Cadotte's Pass, Cœur d'Alêne Mission, north of the Cœur d'Alêne lake, and the Snoqualmoo Pass, using the long tunnel. Entire distance, 1,544.51 *miles.*

	Miles.		Per mile.	
Breckinridge to crossing of Milk river	712	at	$40,000	$28,480,000
Crossing of Milk river to point of departure from Box Elder creek	30	"	40,000	1,200,000

	Miles.		Per mile.	
Thence to Fort Benton	51.5	at	$80,000	$4,120,000
Fort Benton to entrance to tunnel	102.2	"	70,000	7,154,000
Short tunnel, 2,640 feet, at $120 per foot	....		......	316,800
Tunnel, 22,123 feet, at $130 per foot	4.19		......	2,875,990
Thence to crossing of Hell-Gate	91.86	"	60,000	5,511,600
Thence to crossing of Bitter Root	65	"	50,000	3,250,000
Thence to entrance into tunnel	35	"	60,000	2,100,000
Tunnel, 1.6 miles, at $130 per foot	1.6	"	......	1,098,240
West end of tunnel to Cœur d'Aléne Mission	48.5	"	60,000	2,910,000
Thence to point beyond crossing of Spokane	70.5	"	60,000	4,230,000
Thence to fork of line to Vancouver	91.25	"	45,000	4,106,250
Thence to crossing of Columbia	20	"	45,000	900,000
Thence to entrance to long tunnel	138.25	"	50,000	6,912,500
Long tunnel, 11,840 yards or $6\frac{3}{4}$ miles, about $140 per foot or $420 per yard	6.75	"	......	5,000,000
Thence to Seattle	75	"	60,000	4,500,000
Total length in miles	1,543.60			84,665,380
Steamers on the Missouri and Columbia				1,500,000
Reservoirs, aqueducts, &c				2,000,000
Depots and permanent fixtures				1,750,000
Engineering and contingencies				5,000,000
				94,915,380
The cost of the short tunnel will be, 4,000 yards, or 2.247 miles, at $390 per yard			$1,560,000	
Add $4\frac{1}{2}$ miles of road and difficult work at $100,000 per mile			450,000	
			2,010,000	
Total cost of short tunnel				2,990,000
				91,925,380

Estimate of cost of road from Breckinridge to Vancouver, via Fort Union, Fort Benton, Cadotte's Pass, Cœur d'Aléne Mission, north of the Cœur d'Aléne lake, and the Dalles. Entire distance, 1,526.60 miles.

	Miles.		Per mile.	
From Breckinridge to fork of line to Vancouver as by A	1,303.60		......	$67,352,880
Thence to crossing of Columbia	20	at	$45,000	900,000
Thence to Dalles	113	"	60,000	6,780,000
Thence to Vancouver	90	"	100,000	9,000,000
	1,526.60			84,032,880
Steamers on the Missouri and Columbia				1,500,000
Reservoirs, aqueducts, &c				2,000,000

Depots and permanent fixtures	$1,750 000
Engineering and contingencies	5,000 000
	94,282,880

Estimate of cost.

	Miles.		Per mile.	
Of branch road from Vancouver to Seattle	172	at	$50,000	$8,600,000
Depots				150,000
Total cost of road				8,750,000

Recapitulation of cost of road from Breckinridge to Seattle, with a branch road to Vancouver, and a branch road from Vancouver to Seattle.

	Miles.	
From Breckinridge to Seattle	1,543.60	$94,915,380
Branch to Vancouver	223.00	16,930,000
Branch from Vancouver to Seattle	172.00	8,750 000
		120,595,380

Estimate of cost of road, as per A *and* B, *leaving the route on Sun river, passing up that river to Elk Fork, thence along that fork to Lewis and Clark's Pass, and thence to its junction with the Big Blackfoot.*

The cost from Fort Benton to Hell-Gate, (crossing to Fort Owen,) as per preceding estimate, is $15,858,390. Distance, 198.25 miles.

The cost for this portion of the route, by Lewis and Clark's Pass, will be as follows:

	Miles.				
Fort Benton to Sun river	55.5	at	$55,000	per mile,	$3,052,500
Thence to ten miles above Forks	48	"	45,000	"	2,160,000
Thence to entrance to tunnel	19.121	"	100,000	"	1,912,100
Tunnel	2.129	"	120	per foot,	1,348,934
Thence to entrance into Big Blackfoot	11.875	"	55,000	per mile,	653,125
Thence to Hell-Gate, (crossing to Fort Owen,)	86.5	"	60,000	"	5,190,000
	223.125				14,316,659

By taking Lewis and Clark's Pass, as above, the distance is increased 24.875 miles, and the cost diminished $1,541,731.

The route by the Missouri to the mouth of Sun river, will increase the cost over the route by the plateau from Fort Benton to Sun river, as follows:

	Miles.		
Fort Benton, *via* Missouri, to Sun river	52.5	at $80,000 per mile,	$4,200,000
Thence up river to where route over plateau strikes it	10.5	" 45,000 "	472,500
	63		4,672,500
Over plateau—			
Fort Benton to Sun river	55.5	" 55,000 "	3,052,500
Increase of distance and cost	7.5		1,620,000

GENERAL RECAPITULATION.

Breckinridge to Seattle.

	Distance.	Cost—long tunnel, Cascades.	Cost—short tunnel, Cascades.
Plateau route, *via* Cadotte's Pass	1,543.6	$94,915,380	$91,925,380
Plateau route, *via* Lewis and Clark's Pass	1,568.475	93,328,649	90,338,649
Missouri and mouth of Sun river route, *via* Cadotte's Pass	1,551.1	96,560,380	93,570,380
Missouri and mouth of Sun river route, *via* Lewis and Clark's Pass	1,575.975	94,973,649	91,983,649

Breckinridge to Vancouver.

	Distance.	Cost.
Plateau route, *via* Cadotte's Pass	1,526.6	$94,282,880
Plateau route, *via* Lewis and Clark's Pass	1,551.475	92,696,149
Missouri and mouth of Sun river route, *via* Cadotte's Pass	1,534.1	95,927,880
Missouri and mouth of Sun river route, *via* Lewis and Clark's Pass	1,558,975	94,341,149

COMPUTATION OF ALTITUDES FROM BAROMETRICAL OBSERVATIONS.—TABLES OF HEIGHTS AND DISTANCES.—METEOROLOGICAL REGISTER.

CHAPTER XVIII.

COMPUTATION OF ALTITUDES FROM BAROMETRICAL OBSERVATIONS.

INSTRUMENTS.—READINGS REDUCED TO 32° F.—LOSS OF FIELD-BOOKS OF 1853.—LIEUTENANT ABBOT'S TABLE OF HORARY OSCILLATIONS IN THE DES CHUTES VALLEY, OREGON TERRITORY.—MR. DOTY'S OBSERVATIONS FROM FORT BENTON TO BADGER RIVER.—CORRESPONDING OBSERVATIONS AT FORT BENTON.—SERGEANT LINT'S OBSERVATIONS AT CANTONMENT STEVENS.—ABNORMAL OSCILLATIONS.—COMPUTATION OF ALTITUDES AT THE STATIONS NOS. 19 AND 20.—GREAT RISE OF THE BAROMETER AT THE BITTER ROOT RIVER.—OBSERVATIONS AT THE MOUTH OF THE ST. REGIS DE BORGIA.—SIMULTANEOUS OBSERVATIONS AT STATIONS 103 AND 114.—MR. DOTY'S OBSERVATIONS BETWEEN THE 11TH AND 22D OF MAY, FROM FORT BENTON TO SUN RIVER.—TABLES OF SERGEANT LINT'S OBSERVATIONS FROM FORT BENTON ACROSS LEWIS AND CLARK'S PASS.

TABLES OF HEIGHTS AND DISTANCES.

FROM FORT BENTON, *via* TETON AND DEARBORN RIVERS, THROUGH LEWIS AND CLARK'S PASS, SEPTEMBER, 1854.—FROM FORT BENTON, *via* SUN RIVER AND THE EASTERN BASE OF THE ROCKY MOUNTAINS, TO BIRCH RIVER, MAY, 1854.—ON GOVERNOR STEVENS'S TRIP TO AND FROM THE BLACKFOOT COUNCIL, 1855–'56.

METEOROLOGICAL REGISTER.

FROM OCTOBER 2, 1854, TO NOVEMBER 5, 1855.

The barometers used on the different expeditions were four of Green's cistern barometers, viz: Numbers 1006, 776, 725, 722, and three of Green's syphon barometers, viz: Numbers 782, 769, and 767. The cistern barometer, Number 722, was called a standard barometer, but was found, on examination by Mr. Doty, to be out of order, and was accordingly rejected. The instrument 1006 was used on the trip to the Blackfoot council. Its index error, as determined at Fort Benton by a comparison of it with the two syphon barometers, Numbers 769 and 782, was +.025.

This instrument was the only one whose index error was determined; the others have, therefore, been assumed as correct.

The instrument used by Mr. Doty in making the observations on his trip to Birch river, and by Private Lint, on his trip through Lewis and Clark's Pass, was instrument Number 776. The observations made with the other barometers have been already given in the first volume of the Pacific Railroad Explorations.

In preparing the observations for computation the observed readings were severally reduced to what they would have been had the temperature been 32° Fahrenheit, which was done by means of the tables of Mr. A. Guyot, published by the Smithsonian Institution. The corrections for instrument error were next applied wherever ascertained.

The field-books of the explorations of the main party in 1853, in which were kept the records of many important observations, were unfortunately lost on their way from Washington Territory to New York, and we are thus deprived of all means of determining, by data actually obtained on the survey, the corrections for hourly and abnormal oscillations in the barometric column.

In the absence of hourly corrections the following table, given by Lieutenant H. L. Abbot, of the Corps of Topographical Engineers, in volume VI, Pacific Railroad Explorations, p. 715, has been used for the observations taken on the trip to and from the Blackfoot council.

TABLE A.

Corrections for horary oscillations.

4 a. m.	—.020	1 p. m.	+.014
5 a. m.	—.032	2 p. m.	+.028
6 a. m.	—.040	3 p. m.	+.034
7 a. m.	—.042	4 p. m.	+.033
8 a. m.	—.037	5 p. m.	+.029
9 a. m.	—.028	6 p. m.	+.020
10 a. m.	—.016	7 p. m.	+.013
11 a. m.	—.007	8 p. m.	+.001
12 m.	+.008	9 p. m.	+.004

This table was deduced from a series of hourly observations taken during five days in the latter part of August, 1855, near the head of Des Chutes valley, Oregon Territory, at an elevation of about four thousand feet above the level of the sea, and a mean temperature of about 50° Fahrenheit. The corrections for 4 a. m. and 5 a. m. are interpolated.

The above table was deduced in this manner: The hourly barometric readings being reduced to the freezing point, as before explained, a mean was taken of the whole number of observations made during the five days, six readings, which were omitted, being interpolated carefully from a constructed daily curve; this mean was called the grand mean, and from it were subtracted the several means of the observations taken at the same hour during the five days, giving the variations of each hour which were minus, or subtractive, when the hourly mean was greater than the grand mean, and plus, or addative, when the hourly mean was the less.

In correcting the observations made between the 11th and 22d of May, 1854, by Mr. Doty, with Green's syphon barometer Number 767, commencing at Fort Benton, thence up the Missouri as far as the mouth of the Sun river, to the Rocky mountains and along their eastern base as far as Badger river, where the instrument was unfortunately broken, the corrections for hourly variations were deduced from a comparison of simultaneous observations made at Fort Benton with the table of horary oscillations furnished by Lieutenant Abbot. The hours of observation at Fort Benton being at 7 a. m., 2 p. m., and 9 p. m., a mean of the observations at these hours, during this period, was taken, and the hourly variations for the hours of 7, 2, and 9 determined in the manner before stated, which were compared with the variations for the same hours in the table of Lieutenant Abbot, and the intermediate variations interpolated. The following is the table:

TABLE B.

Corrections for horary oscillations.

4 a. m.	—.005	1 p. m.	+.007
5 a. m.	—.017	2 p. m.	+.020
6 a. m.	—.025	3 p. m.	+.029
7 a. m.	—.027	4 p. m.	+.033
8 a. m.	—.024	5 p. m.	+.030
9 a. m.	—.020	6 p. m.	+.022
10 a. m.	—.008	7 p. m.	+.018
11 a. m.	—.006	8 p. m.	+.010
12 m.	+.004	9 p. m.	+.008

In calculating the corrections for the observations made by Sergeant Lint, on a trip from Fort Benton through Lewis and Clark's Pass, between the 7th and 17th of September, 1854, there being no simultaneous observations made at Fort Benton, the following table of hourly corrections was deduced from a series of simultaneous observations at Cantonment Stevens, made at the hours of 7 a. m., 9 a. m., 2 p. m., and 7 p. m., from which the hourly corrections for these hours were determined, and the intermediate ones interpolated.

TABLE C.

Corrections for horary oscillations.

Sunrise	—.015	2 p. m.	+.023
7 a. m.	—.035	3 p. m.	.040
8 a. m.	—.021	4 p. m.	.048
9 a. m.	—.014	5 p. m.	.037
10 a. m.	—.008	6 p. m.	.032
11 a. m.	—.003	Sunset	.030
12 m.	+.009	7 p. m.	.024
1 p. m.	.012	8 p. m.	.016

ABNORMAL OSCILLATIONS.

In preparing the observations for computation, it is necessary to apply corrections for abnormal oscillations in the barometric column, which are caused by general movements in the atmosphere, which are shown, by repeated and numerous observations, to extend rapidly and progressively over large tracts of country. These corrections form a very important element in the computation of altitudes by the method of Lieutenant Abbot, and are obtained from simultaneous observations made at some fixed station in the vicinity of the field observations.

The following tables of abnormal oscillations used in the correction of the observations made by Mr. Doty in May, 1854, between Fort Benton and Badger river, along the eastern base of the Rocky mountains, and for the observations made by Sergeant Lint in September, 1854, from Fort Benton across the Rocky mountains, by Lewis and Clark's Pass, to the Big Blackfoot, were obtained in the following manner: The observations made with the stationary barometer during the time occupied by the survey being all reduced to what they would have been if the mercury had been at 32° Fahr., a mean of all the observations taken at each particular hour was found, and the difference between this mean and any observation taken at the same hour was taken as the abnormal correction for the corresponding hour of the field observations.

Table D being calculated in this manner from observations made at Fort Benton in May, 1854, and table E from observations made at Cantonment Stevens in September of the same year.

TABLE D.—*Abnormal corrections.*

Date.	7 a. m.	2 p. m.	9 p. m.	Temperature at—		
				7 a. m.	2 p. m.	9 p. m.
1854.						
May 11	+ 154	+ 220	+ 204	52	67	60
12	+ 251	+ 165	+ 124	45	63	45
13	+ 072	+ 105	+ 024	44	63	51
14	— 032	— 083	— 114	52	62	56
15	— 112	— 122	— 104	44	65	54
16	— 106	— 069	— 051	52	73	62
17	— 071	+ 008	+ 012	60	76	60
18	— 177	— 127	— 052	60	73.5	69
19	— 132	— 170	— 182	63	74	57.5
20	— 296	— 043	+ 054	59	72.5	66
21	+ 030	+ 062	+ 076	63	81.5	64
22	+ 061	+ 095	+ 126	69	87.5	66

Table E of abnormal corrections which were used in computing the altitudes from the observations made from May 11 to May 22, 1854, between Fort Benton and Badger river, along the eastern base of the Rocky mountains, was obtained as follows: The simultaneous observations made at Cantonment Stevens, at each particular hour during the above period, viz: from May 11 to May 22, being reduced to the freezing point and corrected for horary variation by the table previously given, were added together and a mean of their several sums taken, the abnormal corrections being the difference between these means and each of the several observations.

Observations were made at Fort Benton during the same period, but as they were made at the hours of 7 a. m., 2 p. m., and 9 p. m., they were useless for the purpose of comparison for determining the abnormal oscillations.

TABLE E.—*Abnormal corrections.*

Date.	7 a. m.	9 a. m.	2 p. m.	7 p. m.
1854.				
September 5	—.066	—.072	—.041	—.051
6	—.058	—.084	—.024	....
7	—.062	—.071	—.044	....
8	—.057	—.050	—.042	—.016
9	—.010	—.022	+.069	+.024
10	+.044	+.020	+.013	+.007
11	+.076	+.054	+.053	+.050
12	+.093	+.080	+.038	+.024
13	—.068	—.097	—.074	—.073
14	—.053	—.049	+.009	+.040
15	—.058	+.052	+.027	—.013
16	—.053	—.094	—.024	+.004
17	—.118	—.038	—.025	—.141

Having thus explained the various corrections which were applied to the observations, we will now consider the methods which were used in computing the altitudes as derived from the observations. The observations taken on the trip to and from the Blackfoot council were calculated by using Guyot's tables, before referred to. The mean reading of the barometer at the level of mean tide at Suisun bay, near Benicia, was uniformly assumed for the reading at the lower station, which, from an extensive series of observations, was found to be thirty thousand and fifty-seven inches, the temperature of the mercury being 32° Fahrenheit, and that of the air 64° Fahrenheit; for the upper station, the mean air temperature for the time during the survey has been used, instead of the observed air temperature. The following is an example of the method of computation:

Data for determining the altitude of Station No. 19, *on the trip to the Blackfoot council on the Cœur d' Alêne river, eleven miles above the Mission, from two observations.*

Date.	Hour.	No. of barometer.	Reading of barometer.	Attached thermometer	Detached thermometer.
June 26, 1855	Sunset	1006	27.464	53	53
June 27, 1855	Sunrise	1006	27.434	53	53

Corrections applied before computation.

	Sunset, June 26	Sunrise, June 27.
Barometric reading	27.464	27.434
Correction for reduction to 32° Fahrenheit	− .060	− .060
Correction for index error	+ .025	+ .025
Correction for horary oscillations, (Table A)	+ .003	− .022
Corrected readings	27.432	27.377

Computation by Guyot's tables.

$$H = 30.057 \quad H' = 27.405 \quad T = 64 \quad T' = 53$$

Table I gives for $H = 30.057$	28725.4
Table I gives for $H' = 27.405$	26339.1
Approximate difference of level D	2386.3
$\frac{D \times (T + T' - 64)}{900} = \frac{2386.3 \times 53}{900}$	=140.4
Second approximate difference, D′	2526.7
Table III gives for $D' = 2526.7$, latitude 47° 30′	− .6
Table IV gives for $D' = 2526.7$	+ 6.6
Altitude of station, in feet	2532.7

The nineteenth station on the Cœur d'Aléne river, eleven miles above the Mission, was computed from two observations, taken at sunset and sunrise. Five other observations were also made at this station, but as they appeared to be much affected by abnormal oscillations, they were rejected, and the altitude computed from the first two observations.

Station No. 26, the last crossing of the Cœur d'Aléne river before crossing the mountain, was made on the eastward trip, and a single observation taken at 2½ p. m., which gives for the altitude 3,617 feet. This has been assumed as the best result which could be obtained; for though the party continued at the same place on the return trip and made both an evening and morning observation, the result was considered as only useful for determining the differences of altitude between this point and five other points higher up the stream, observed on the day following the evening we reached the crossing, and which are, respectively, ¼, ½, ½, 1, ¼ mile from each other.

The heights of the crossing and the several points of observation on the return trip are 3,573.7, 3,578, 3,643.7, 3,709.6, 3,810.7, and 3,834.4; giving these differences: 4.3, 70, 135.9, 237, and 260.7, between the points 1, 2, 3, 4, and 5, and the crossing; which, added to the adopted altitude of the crossing, 3,617, give for the heights of these points 3,621.3, 3,687, 3,752.9, 3,854, and 3,877.7.

At the camp of the 5th and 6th of July, on the Bitter Root river, there was a great rise of the barometer from evening to morning, the height of the column at sundown, when reduced to the freezing point, being 26.874, and at sunrise 27.090. The two observations have been combined, and the result thus deduced has been assumed as the altitude of the camp above the sea. An observation was taken near the mouth of the St. Regis de Borgia river half an hour after the morning observation at camp, which was computed, and the result compared with the altitude founded upon the morning observation at the camp. Though there was a great change from evening to morning, the change for half an hour would be inconsiderable; the difference between the two latter computations has, therefore, been taken as the absolute difference between the altitudes of the two points, and it has been subtracted from the result obtained by combining both observations at the camp, and considered as the absolute altitude of the mouth of the St. Regis de Borgia.

The altitudes of the stations between 103 and 114, inclusive, were determined by a comparison with simultaneous observations made with instrument No. 769 stationed on Teton river, two miles west from Fort Benton; station No. 102 was compared with an observation made 14 miles up the Teton at 1½ p. m., where the camp was temporarily located. After taking the observation the camp was moved to about two miles west of Fort Benton, where it continued during the remainder of this portion of the survey. The method of making the calculation with simultaneous observations is given and explained in the prefatory remarks to Guyot's tables. The only difference between the computation of this and the other portion of the trip, being that the reading of the barometer at the Teton, during the period of these observations, was taken at the lower station, instead of the mean reading of the barometer at Suisun bay, (30.057,) which was taken at the lower station in computing the previous observations, as before explained.

The observations made by Mr. Doty between the 11th and 22d of May, 1854, from Fort Benton up the Missouri as far as the great falls and mouth of Sun river, thence up Sun river to the Rocky mountains, and along their eastern base to Badger river, were reduced to the freezing point, and corrected for horary oscillations by means of table B and table E, applied for

abnormal corrections. No instrument error is given, so the index reading has been assumed as correct.

After being corrected as above, the altitudes were calculated by the tables of Mr. Guyot, the process being somewhat shortened by the method of preparation.

The following example will show the method of computing these observations, as also the observations of Lint from Fort Benton across Lewis and Clark's Pass.

EXAMPLE.

Data for determining the altitude of Birch river, in the mountains, by three observations.

Date.	Hour.	No. of barometer.	Reading of barometer.	Attached thermometer.	Detached thermometer.
				°	°
May 21, 1854	2 p. m.	2	25. 374	76	74
May 21, 1854	9 p. m.	....	25. 834	53	53
May 22, 1854	Sunrise	....	25. 374	54	52

Corrections applied before computation.

	2 p. m., May 21.	9 p. m., May 21.	Sunrise, May 22.
Barometric reading	25. 374	25. 834	25. 374
Correction to reduce to 32° Fahrenheit	— 108	— 057	— 058
Correction for index error	000	000	000
Correction for horary oscillations	Table B, + .020	+ 008	— 020
Correction for abnormal oscillations	Table D, + .062	+ 076	+ 061
Corrected readings	25. 348	25. 861	25. 357

Mean of corrected readings, 25. 522 ; mean temperature, 67.

Computation by Guyot's tables.

$H = 30.057$ .... $T = 64$

$H' = 25.522$ .... $T' = 67$

Table I gives for $H = 30.057$		28752.4
Table I gives for $H' = 25.522$		24479.4
Approximate difference of level D		4273.0
$\frac{D \times (T + T' - 64)}{900} = \frac{4273 \times 67}{900} =$	+	318.10
Second approximate difference D'		4591.10
Table III gives for $D' = 4591.10$, Lat. 48° 10'	—	1.30
Table IV gives for $D' = 4591.10$	+	12.8
Altitude of station, in feet		4602.6

APPENDICES.

APPENDIX A.

HEIGHTS AND DISTANCES.

Observations on route of Governor Stevens to and from the Blackfoot Council, 1855 *and* 1856.

No. corresponding to profile.	Locality.	Date.	Hour.	Distance between stations.	Barometer reading, (No. 1006.)	Attached thermometer.	Detached thermometer.	Mean corrected barometer.	Altitudes.	Remarks.
		1855.		*Miles.*	*Inches.*	°	°	*Inches.*	*Feet.*	
2	Dry creek	June 16	Sunset	7.0	27.350	48	47	......	......	Air got into tube; restored.
		17	Sunrise	......	27.310	52	52	27.310	2,048.6	From mean of observations.
3	Divide between Dry creek and Touchet river.	17	10 a. m	4.0	27.776	68	69	27.687	2,316.4	
4	Pa-ah-te-tah creek	17	Sunset	17.0	27.934	55	55	......	......	Air in tube; restored.
		18	Sunrise	......	27.942	55	55	27.900	2,069.8	From mean of observations.
5	Pa-ta-haha creek	18	Sunset	22.0	27.630	62	61	......	......	
		19	Sunrise	......	27.650	45	46	27.604	2,362.5	Do. do.
6	Snake river, at the mouth of Alpahwah creek.	19	Sunset	17.75	28.822	74	74	......	......	
		20	Sunrise	......	28.904	58	57	28.793	1,206.3	Do. do.
7	Springs	20	Sunset	23.0	26.790	69	69	......	......	
		21	Sunrise	......	26.844	55	......	26.764	3,249.1	Detached therm'r broken.
8	Divide between waters of Snake and Peluse rivers.	21	11.30 a. m	11.0	26.688	77	......	......	......	
		21	1 p. m	......	26.710	77	......	26.633	3,338.7	
9	Peluse river	21	Sunset	7.0	27.250	60	......	......	......	
		22	Sunrise	......	27.342	45	......	27.264	2,702.8	
10	Divide between Peluse river and Kamas Prairie creek.	22	¼ bef. sunset.	17.0	26.090	69	......	26.030	4,057.1	
11	Kamas Prairie creek	22	Sunset	1.0	27.150	66	......	......	......	
		23	Sunrise	......	27.110	48	......	27.078	2,906.2	
12	Four miles above divide between Kamas Prairie and Na-ill-ha-likum creeks.	23	9½ a. m	4.0	26.904	84	......	26.769	3,318.0	
13	Divide between Nidl-hudik and branch of St. Joseph's river.	23	11¾ a. m.	5.0	26.510	83	......	26.410	3,701.1	
14	Foot of hill near Lake Poum	23	1¾ p. m.	6.0	27.276	87	......	27.182	2,889.4	
15	Between Lake Poum and St. Joseph's river.	23	Sunset	4.0	27 260	71	......	27.208	2,795.8	
		24	Sunrise	......	27.280	58	......	......	......	
16	Divide between St. Joseph's and Cœur d'Aléne river.	24	11½ a. m.	8.0	26.590	77	......	26.500	3,581.6	Barometer tube broken.
17	Cœur d'Aléne river, lower crossing	25	7½ a. m.	7.0	27.600	59	......	27.512	2,253.6	Tube replaced.
18	Cœur d'Aléne Mission	26	2 p. m.	11.0	27.588	74	......	27.529	2,290.8	Barometer tube refilled.

APPENDIX A—Continued.

No. corresponding to profile.	Locality.	Date.	Hour.	Distance between stations.	Barometer reading, (No. 1006.)	Attached thermometer.	Detached thermometer.	Mean corrected barometer.	Altitudes.	Remarks.
		1855.		*Miles.*	*Inches.*	°	°	*Inches.*	*Feet.*	
19	Cœur d'Aléne river, 11 miles above the Mission.	June 26	Sunset	11.0	27.464	53				
		27	Sunrise		27.434	53		27.405		
		27	Sunset		27.610	50				
		28	Sunrise		27 700	48				
		28	2 p. m.		27.790	62				
		28	Sunset		27.800	52				
		29	Sunrise		27.884	45		27.642	2,333.1	From mean of observations.
20	Cœur d'Aléne river, 19 miles above the Mission.	29	12½ p. m.	8.0	27.736	71		27.668	2,340.5	
21	Cœur d'Aléne river, 24 miles above the Mission.	29	Sunset	5.0	27.466	54				
		30	Sunrise		27.410	41		27.418	2,533.2	
22	Fork of trail at foot of mountain	30	11½ a. m.	6	27.244	78		27.150	2,896.0	
23	Mouth of a small creek, six miles from summit.	30	4½ p. m.	9.0	26.980	73		26.931	3,110.0	
23½	Camp above same creek	30	Sunset		26.490	62				
		July 1	Sunrise		26.510	44		26.469	3,526.2	
24	Cœur d'Aléne river, four miles from summit.	1	12½ p. m.	2.0	26.824	75				
	Same after three minutes	1			26.810	71		26.745	3,304.3	
25	On the road, two miles from summit	1	2 p. m.	2.0	26.584	74		26 529	3,538.6	
26	On the road, three miles from summit	1	2½ p. m.	1.0	26.510	75		26.456	3,617.8	
27	Summit of Cœur d'Aléne or Stevens's Pass	1	3½ p. m.	1.0	25.134	70		25.099	5,089.7	
28	Creek, one mile east of summit	1	4½ p. m.	1.0	25.798	68		25.763	4,343.6	
29	Main stream of St. Regis de Borgia	1	5½ p. m.	0.5	25.976	71		25.931	4,173.1	
30	Crossing of St. Regis de Borgia, two and one-half miles east of summit.	1	6½ p. m.	1.0	26.140	70		26.086	4,000.6	
31	Camp on St. Regis de Borgia, six miles east of summit.	1	Sunset	3.5	26.330	57				
		2	Sunrise		26.350	34		26.326	3,647.5	
32	Second crossing of St. Regis de Borgia	2	6 a. m.	1.0	26.496	73		26.376	3,639.9	
33	On the trail at the forks of the St. Regis de Borgia.	2	7 a. m.	1.0	26.520	74		26.395	3,683.3	
34	Two miles beyond forks	2	8 a. m.	2.0	26.608	78		26.482	3,604.7	
35	On the road, five miles beyond forks	2	10 a. m.	3.0	26.766	80		26.651	3,430.6	
36	On the road, twelve miles beyond forks.	2	2 p. m.	7.0	26.926	77		26.862	3,195.5	
37	Camp on the St. Regis de Borgia river, 14.5 miles beyond the forks.	2	Sunset	2.5	26.974	57				
		3	Sunrise		26.964	57				Appearance of rain.
		3	8 a. m.		26.966	62		26.910	3,086.8	From mean of observations.
38	St. Regis de Borgia river, 18 miles below the forks.	3	11 a. m.	3.5	27.050	70		26.968	3,061.6	
39	On trail crossing of the creek, 20 miles below the forks.	3	12½ p. m.	2.0	26.912	78		26.792	3,234.0	
40	Summit of divide between St. Regis de Borgia and Bitter Root rivers.	3	1½ p. m.	1.5	25.880	79		25.809	4,342.0	
41	Left bank of Bitter Root river	3	Sunset	7.0	27.230	67				
		4	Sunrise		27.250	42		27.205	2,763.4	
42	Mouth of St. Regis de Borgia river	4	8 a. m.	1.0	27.280	78				
	Second reading	4			27.278	77		27.149	2,893.9	
43	Camp on Bitter Root river	4	Sunset	1.0	27.130	66				
	Right bank, on a bluff, one mile from mouth of St. Regis de Borgia.	5	Sunrise		27.154	49		27.089	2,896.9	
44	At river, ten miles from mouth of St. Regis de Borgia.	5	3 p. m.	9.0	27.116	94		27.018	3,083.8	

APPENDIX A—Continued.

No. corresponding to profile.	Locality.	Date.	Hour.	Distance between stations.	Barometer reading, (No. 1006.)	Attached thermometer.	Detached thermometer.	Mean corrected barometer.	Altitudes.	Remarks.
		1855.		*Miles.*	*Inches.*	°	°	*Inches.*	*Feet.*	
45	Camp on small creek, twenty-two miles from mouth of St. Regis de Borgia.	July 6	Sunrise	....	27.144	52	. . . .	27.090	....	
	At river, opposite camp	6	¼ p. sunrise..	....	27.226	53	......	27.177	....	
46	On trail, 26.5 miles from mouth of St. Regis de Borgia.	6	10 a. m......	4.5	27.214	71	.....	27.121	2,905.4	
47	Camp on the Kho-alhl creek..............	6	Sunset	29.0	27.040	58	......	....	....	
		7	Sunrise	....	27.080	46	......	27.030	2,941.1	
49	Camp at Big Blackfoot, above junction of Hell-Gate.	18	Sunset	13.0	26.814	74	73	....	....	
		19	Sunrise......	....	26.842	54	53	27.769	3,247.2	
50	On trail, 4½ miles above junction of Hell-Gate.	19	10 a. m......	4.5	26.774	83	84	26.653	3,942.4	Thirty-inch tube in place of broken one.
51	Camp on Big Blackfoot river, nineteen miles above junction of Hell-Gate.	19	Sunset	14.5	26.494	71	68	....	....	
		20	Sunrise......	....	26.484	51	51	....	....	
		20	8 a. m.......	....	26.524	57	55	26.438	3,573.4	From mean of observations.
52	Up river, in cañon	20	11 a. m......	11.0	26.248	74	73	26.159	3,933.9	
53	Camp at Big Blackfoot, near junction of Salmon Trout creek.	20	Sunset	13	26.041	55	52	....	....	
		21	Sunrise......	....	26.046	40	39	....	....	
		21	¼ p. sunrise..	....	26.056	46	46	26.024	3,966.0	
54	On trail, eight miles beyond mouth of Salmon Trout creek.	21	8 a. m.......	8.0	25.818	74	72	25.704	4,426.4	
55	On trail, 18.5 miles beyond mouth of Salmon Trout creek.	21	2½ p. m......	10.5	25.696	71	70	25.652	4,474.6	
56	Camp on Big Blackfoot, below junction of Lander's Fork.	21	Sunset	11	25.458	59	58	....	....	
		22	Sunrise......	....	25.466	41	40	25.437	4,610.2	
57	Plateau above forks of trail	22	8 a. m.......	2.0	25.422	70	67	25.318	4,829.6	
58	First creek above forks of trail..........	22	9 a. m.......	4.0	25.300	79	77	25.183	5,031.6	Warm; clouds light and broken.
59	One and a half mile from the bridge towards mouth of the creek.	22	11 a. m.	1.5	24.856	81	78	24.757	5,522.6	
60	Ridge between the creek and a prairie ..	22	1¼ p. m......	1.5	24.794	84	81	24.710	5,588.8	
61	Up bend of the creek	22	1¾ p. m......	0.5	25.012	83	81	24.940	5,329.2	
62	Trail from Lander's Fork strikes the creek.	22	2¼ p. m.... .	0.1	24.902	83	80	24.835	5,457.6	
63	Five miles further up the creek.........	22	4.10 p. m....	5.0	24.608	73	71	24.568	5,698.6	
64	Foot of divide	22	4½ p. m......	0.5	24.434	72	70	24.394	5,893.5	
65	2,400 feet, summit of divide, Lewis and Clark's Pass.	22	5 p. m.......	0.3	23.890	71	69	... .	....	
		22	5.5 p. m.....	....	23.882	69	68	23.849	6,519.3	
66	Down divide, one mile from summit	22	6 p. m.......	1.0	24.850	72	72	24.798	5,397.0	
67	Foot of divide, crossing a stream	22	6.25 p. m...	6.2	25.062	64	57	25.025	5,104.0	
68	Second crossing of stream	22	6.35 p. m....	0.5	25.184	63	57	25.091	5,030.6	
69	Ridge	22	7¼ p. m......	2.0	24.978	70	69	24.868	5,345.6	
70	Camp at creek..........	22	9 p. m.......	2.25	25.284	63	62	....	....	
		23	Sunrise......	....	25.254	53	51	25.222	4,882.0	
71	On trail, 2¾ miles west of Dearborn river.	23	9.8 a. m....	3.0	25.284	84	83	25.157	5,092.1	
72	On trail, ¾ mile west of Dearborn river..	23	10 a. m......	2.0	25.288	86	83	25.167	5,030.8	
73	On trail, ¼ mile west of Dearborn river..	23	10⅓ a. m....	0.5	25.386	89	87	25.261	4,994.0	
74	Valley of Dearborn river, ⅓ mile wide...	23	10⅔ a. m.....	0.25	25.650	87	82	25.531	4,665.2	
75	Top of immediate ascent from Dearborn river.	23	11 a. m..	0.16	25.516	79	77	25.419	4,766.4	
76	Top of ridge............................	23	11½ a. m.....	0.7	25.362	84	78	25.256	4,954.5	
77	Do..............................	23	1 5-6 p. m....	6.21	25.408	86	87	25.328	4,918.2	
78	Do..............................	23	2¾ p. m	5.09	25.758	77	73	25.705	4,413.7	
79	Do..............................	23	4 p. m.......	5.0	25.988	91	89	25.893	4,292.9	

APPENDIX A—Continued.

No. corresponding to profile.	Locality.	Date.	Hour.	Distance between stations.	Barometer reading, (No. 1006.)	Attached thermometer.	Detached thermometer.	Mean corrected barometer.	Altitudes.	Remarks.
		1855.		*Miles.*	*Inches.*	°	°	*Inches.*	*Feet.*	
80	Camp above junction of forks of Sun river.	July 23	Sunset	1.56	26.058	72	70	....	....	
		24	Sunrise......	....	25.956	55	54	25.950	4,114.1	
81	Edge of bank north side of Sun river ...	24	8 1-12 a. m...	0.37	25.974	80	79	25.847	4,300.3	
82	Top of 1st plateau	24	8¾ a. m......	2.0	25.620	81	78	25.497	4,684.0	
83	Top of 2d plateau......................	24	9¼ a. m......	2.63	25.448	83	80	25.330	4,881.2	
84	Top of 3d plateau..............	24	10.5 a. m....	3.25	25.434	83	82	25.326	4,895.6	
85	Top of 4th plateau.....	24	10.25 a. m...	1.51	25.674	87	84	25.565	4,636.5	
86	Top of 5th plateau................	24	12.25 p. m...	3.0	25.814	88	86	25.713	4,480.2	
87	Foot of 5th ridge......................	24	12.40 p. m...	0.39	26.014	92	90	25.898	4,292.7	
88	End of plateau, commencement of descent to Teton river.	24	2 p. m.......	5.0	26.070	91	88	25.978	4,216.6	
89	1st camp on Teton river, 18.4 miles from forks of Sun river.	24	Sunset	0.25	26.128	69	67	....	....	
		25	Sunrise......	....	26.088	65	62	26.044	4,023.2	
90	Plateau bordering on the river, 10 miles below camp.	25	9¼ a. m......	10.0	26.120	73	70	26.020	4,070.0	
91	Teton river, 18 miles below camp.......	25	12½ p m.....	8.0	26.418	69	66	26.357	3,692.5	Slight rain.
92	Camp down Teton river, 30 miles below 1st camp.	25	Sunset.	12.0	26.626	59	57	....	....	
92	2d camp, 30 miles below 1st camp, on the Teton river.	25	Sunset	12.0	26.626	59	57	....	.... ..	
		26	Sunrise......	....	26.638	42	40	26.610	3.362.9	From mean of observations.
93	Plateau bordering on river, north side ...	26	8¾ a. m......	2.25	26.536	70	62	26.433	3,597.7	
94	Teton river, 1st crossing, 5 miles below 2d camp.	26	9.40 a. m....	2.75	26.747	73	70	26.649	3,397.8	
95	Teton river, 2d crossing..............	26	12¼ p. m.....	8.0	26.792	74	71	26.717	3,329.2	
96	Plateau above river, north side, 18 miles below 2d camp.	26	1.55 p. m....	5.0	26.624	81	79	26.552	3.533.2	
97	3d camp at Teton river, 27 miles below 2d camp.	26	Sunset	9.0	26.890	67	65	....	....	
		27	Sunrise......	....	26.936	42	40	26.875	3,108.7	
98	Plateau above the Teton river, south side, 1 mile below 3d camp.	27	8 a. m.......	1.0	26.920	77	65	26.794	3,227.8	
99	Plateau above the Teton river, south side, 8 miles below 3d camp.	27	10 a. m......	7.0	27.004	80	74	26.889	3,157.5	
100	Plateau above the Teton river, south side, 13 miles below 3d camp.	27	11.25 a. m...	5.0	26.874	81	75	26.773	3,283.5	
102	Crossing of Marias river, 13 miles from camp on the Teton.	Aug. 11	1½ p. m......	13.0	27.378	66	63	27.332	2,682.9	
103	Top of bluff on the Marias river.........	11	2¼ p. m......	0.87	27.182	71	63	27.112	2,895.1	
104	Spring top of bank, 13.1 miles beyond the crossing of the Marias.	11	5 p. m.......	10.54	27.066	63	60	27.037	2,982.2	
106	On the trail near Box Elder creek.......	12	11½ a m.....	15.36	27.160	68	65	27.055	2,924.3	
107	At Box Elder creek.....................	12	12½ p. m. ...	4.0	27.400	72	72	27.329	2,691.7	
108	Below camp at Box Elder creek	12	Sunset	10.0	27.462	59	57	....	....	
		13	Sunrise......	....	27.460	51	50	27.409	2,558.5	
109	Milk river at crossing, 2 miles below trading-house.	13	Sunset	20.0	27.674	56	55	....	....	
		14	Sunrise......	....	27.620	50	48	....	....	
		14	2 p. m.......	....	27.644	63	61	....	....	
		14	Sunset	....	27.618	56	53	....	....	
		15	Sunrise......	....	27.562	45	43	27.572	2,388.8	From mean of observations.
110	Tributary to Box Elder creek.	15	Sunset	28.0	27.510	53	52	....	....	
		16	Sunrise......	....	27.482	41	40	27.473	2,475.0	
111	On the trail 16 miles from last station...	16	10 a. m......	16.0	27.144	73	67	27.047	2,971.9	

APPENDIX A—Continued.

No. corresponding to profile.	Locality.	Date.	Hour.	Distance between stations.	Barometer reading, (No. 1006.)	Attached thermometer.	Detached thermometer.	Mean corrected barometer.	Altitudes.	Remarks.
		1855.		*Miles.*	*Inches.*	°	°	*Inches.*	*Feet*	
112	Crossing of the Marias river, right bank.	Aug. 16	Sunset	20.0	27.530	61	56	....	....	
		17	Sunrise......	....	27.510	44	42	27.484	2,770.8	
114	Missouri river, ¼ mile above Fort Benton.	Sept. 12	Sunset	....	27.262	62	59	....	....	
		13	Sunrise......	....	27.466	43½	42½	....	....	
115	Missouri river at the Cracon du Nez...	13	2¾ p. m.....	4.0	27.414	60	54	27.395	2,751.75	The Cracon du Nez is the divide between the waters of the Teton and Missouri rivers.
116	Teton valley, 60 feet from dividing bluff.	13	3 p. m......	22.0	27.336	63	60	27.331	2,833.25	
1	Camp on Missouri river, 15 miles from Treaty Ground.	Oct. 23	7 p. m.......	15.0	27.566	44	42	....	....	
		24	Sunrise......	....	27.356	28	27	27.438	2,479.8	
2	Fort Campbell, ½ mile above Fort Benton.	24	7 p. m.......	35.5	27.028	62	62	....	....	
		25	Sunrise......	....	27.272	48	47	....	....	
		25	2 p. m.......	....	27.230	60	59	....	....	
		25	Sunset	....	27.208	57	56	....	....	
		26	Sunrise......	....	27.256	52	53	....	....	
		26	2 p. m.......	....	27.180	66	66	....	....	
		26	Sunset	....	27.168	62	61	....	....	
		27	Sunrise......	....	27.346	41	40	....	....	
		27	2 p. m.......	....	27.220	56	55	....	....	
		27	Sunset	....	27.180	56	56	....	....	
		28	Sunrise......	....	27.042	62	61	27.149	2,768.8	From mean of observations.
3	Teton river, 13¼ miles from Fort Benton.	28	Sunset	14.0	26.110	32	32	....	....	
		29	Sunrise......	....	27.162	13	12	27.170	2,768.8	Snow 2½ inches during night.
4	Teton river, 31½ miles from Fort Benton.	29	Sunset	18.0	26 760	29	29	....	....	
		30	Sunrise......	....	26.492	34	33	....	....	
		30	2 p. m.......	....	26.674	44	40	....	....	
		30	Sunset	....	26.706	37	36	....	....	
		31	Sunrise......	....	26.758	36	35	....	....	
		31	2 p. m.......	....	26.768	54	51	....	....	
		31	Sunset	....	26 724	47	45	....	....	
		Nov. 1	Sunrise......	....	26.582	41	39	....	....	
		1	2 p. m.......	....	26.614	51	50	....	....	
		1	Sunset	....	26.672	41	40	....	....	
		2	Sunrise......	....	27.062	28	28	....	....	
		2	2 p. m.......	....	27.046	40	38	....	....	
		2	Sunset	....	26.982	35	34	....	....	
		3	Sunrise......	....	26.732	34	33	....	....	
		3	2 p. m.......	....	26 572	53	50	....	....	
		3	Sunset	....	26 520	45	43	....	....	
		4	Sunrise......	....	26.554	37	36	26.703	3.227.9	
5	Teton river...........................	4	Sunset	....	26.570	28	28	....	....	
		5	Sunrise......	....	26.412	13	13	26.527	3,346.8	
6	Sun river, about 6 miles from Crown Butte.	5	7 p. m.......	33.0	......	......	......	....	....	
		6	Sunrise......	....	25.984	26	25	25.975	3,929.9	
7	Dearborn river........................	6	Sunset	....	25.446	36	36	....	....	
		7	Sunrise......	....	25.668	20	18	25.577	4,355	
8	Six miles from divide of Cadotte's Pass, and 6 miles from forks of trail to Lander's Fork.	8	Sunset	1.44	24.718	33	32	....	....	
		8	Sunrise	....	24.754	30	30	24.749	5,265.6	Snowing slightly.

APPENDIX A—Continued.

No. corresponding to profile.	Locality.	Date.	Hour.	Distance between stations.	Barometer reading, (No. 1006.)	Attached thermometer.	Detached thermometer.	Mean corrected barometer.	Altitudes.	Remarks.
		1855.		*Miles.*	*Inches.*	°	°	*Inches.*	*Feet.*	
9	Camp 1 mile above cañon..............	Nov. 8	Sunset	15.45	25.500	29	28	....	....	
		9	Sunrise......	....	25.400	27	25	25.494	4,440.4	
10	Salmon Trout creek, 1 mile above crossing.	9	Sunset	21.0	25.680	31	29	....	....	
		10	Sunrise......	....	25.542	29	29	25.628	4,310.5	
11	Same camp as 19th and 20th July.......	10	Sunset	27.52	26.138	28	28	....	....	
		11	Sunrise......	....	26.290	24	24	26.241	3,659	
12	Hell-Gate river, 1¼ mile from Hell-Gate.	12	Sunrise.....	16.9	26.448	27	27	....	....	
		12	2 p. m.......	....	26.482	39	37	....	....	
		12	Sunset	....	26.500	29	29	....	....	
12	Do.....................do..........	13	Sunrise......	....	26.646	19	19	....	....	
		13	2 p. m.......	....	26.674	35	33	26.576	3,328.1	From a mean of observations.
13	One-quarter mile below the Council Ground, and one-quarter mile from Bitter Root river.	13	½ past sunset.	3.86	26.790	37	30	....	....	
		14	Sunrise......	....	26.834	16	16	26.835	3,046.0	
14	Eight miles below the Council Ground.	14	Sunset	7.72	26.896	29	28	....	....	
		15	Sunrise......	....	26.990	20	20	26.977	2,918.6	
15	Thirty-four miles below the Council Ground.	15	Sunset	25.11	27.058	34	32	....	....	
		16	Sunrise......	....	26.888	29	29	26.990	2,903.7	
16	Camp 52 miles below the Council Ground	16	Sunset	17.38	27.176	44	43	....	....	
		17	Sunrise......	....	27.300	34	34	27.236	2,691.8	
17	Left bank of Bitter Root river, sixty poles below camp of 3d and 4th July.	17	Sunset	14.46	27.410	40	40	....	....	
		18	Sunrise......	....	27.378	34	33	27.392	2,530.5	
18	St. Regis de Borgia river	18	Sunset	15.45	26.818	40	40	....	....	
		19	Sunrise......	....	26.996	35	35	26.908	3,019.8	
19	Up river at 19th crossing................	19	Sunset	10.63	26.812	34	34	....	....	
		20	Sunrise......	....	26.846	22	21	26.853	3,042.8	
20	West foot of divide, up crossing of stream.	20	Sunset	13.28	26.490	38	35	....	....	
		21	Sunrise......	....	26.330	28	28	26.420	3,573.7	
	Crossing right bank	21	½ past sunrise	....	26.340	28	28	26.332	3,617.2	
	Up stream, at the forks................	21	9 a. m.......	0.24	26.300	28	28	26.328	3,621.3	
	Up stream	21	9.32 a. m....	0.48	26.270	32	28	26.265	3,687.0	
	Up stream, left bank	21	10.30 a. m...	0.48	26.234	37	35	26.227	3,752.9	
	Do..................................	21	11.22 a. m...	0.96	26.104	32	31	26.114	3,854.0	
	Summit of divide........................	21	11.50 a. m...	0.24	26.064	31	31	26.090	3,877.7	
21	7.16 miles from summit of divide.......	21	Sunset	7.16	....	......	......	....	....	
		22	Sunset	....	26.600	32	32	....	....	
		23	Sunrise......	....	26.414	24	23	26.531	3,367.9	
22	Camp 21.36 miles from summit.........	23	Sunset	14.2	27.250	29	28	....	....	
		24	Sunrise......	....	27.328	30	30	27.309	2,592.2	
23	Camp 44.46 miles from summit.........	24	Sunset	12.8	27.732	33	33	....	....	
		25	Sunrise......	....	27.922	32	32	27.840	2,079.4	
24	Camp at Cœur d'Aléne Mission.........	25	Sunset	11.63	28.112	33	34	....	....	
		26	Sunrise......	....	28.124	27	27	....	....	
		26	2 p. m.......	....	28.174	41	41	....	....	
		26	Sunset	....	28.176	41	42	....	....	
		27	Sunrise......	....	28.112	27	27	28.155	1,776.8	
25	Camp towards Wolf's Lodge, 16 miles from Cœur d'Aléne Mission.	27	Sunset	16.0	27.964	35	33	....	....	
		28	Sunrise......	....	27.616	21	19	27.814	2,090.2	Snowing slightly.
26	Outlet of Cœur d'Aléne lake	28	11.50 a. m...	10.0	27.676	37	35	27.682	2,240.0	
27	House of Antoine Plante..................	28	7 p. m.......	18.0	....	......	......	....	....	
		29	Sunrise......	....	27.940	31	31	27.912	2,006.0	

APPENDIX A—Continued.

No. corresponding to profile.	Locality.	Date.	Hour.	Distance between stations.	Barometer reading, (No. 1006.)	Attached thermometer.	Detached thermometer.	Mean corrected barometer.	Altitudes.	Remarks.
		1855.		*Miles.*	*Inches.*	°	°	*Inches.*	*Feet.*	
28	One-quarter mile from A. Plante's house, towards the river.	Nov. 29	Sunset	0.25	27.876	34	33	....	....	
		30	Sunrise......	....	27.592	42	40	....	....	
		Dec. 1	Sunrise......	....	28.134	30	30	....	....	
		1	Sunset	....	28.168	35	33	....	....	
		2	Sunrise......	....	27.968	28	27	....	....	
		2	Sunset	....	27.994	33	33	....	....	
		3	Sunrise......	....	27.936	35	33	....	....	
		4	Sunrise......	....	27.806	33	33	....	....	
		5	Sunrise......	....	27.818	27	25	....	....	
		5	Sunset	....	27.724	35	33	....	....	
		6	Sunrise......	....	27.728	20	18	27.829	2,094.8	Two inches of snow fell last night.
29	Up Cœur d'Aléne river, left bank, 1.25 mile from Antoine Plante's.	6	Sunset	1.0	27.770	36	34	....	....	
		7	Sunrise......	....	27.714	33	31	27.750	2,168.3	
30	Up river, one mile from lake	7	Sunset	4.0	27.384	26	24	....	....	
		8	Sunrise......	....	27.492	31	31	27.435	2,465.1	
31	Camp on Kamas or Nidl-budlk creek ...	8	Sunset	25.0	27.346	31	30	....	....	
		9	Sunrise......	....	27.384	36	33	27.376	2,532.9	
32	Kamas prairie	9	Sunset	25.0	27.028	39	37	....	....	
		10	Sunrise......	....	27.090	39	36	27.056	2,866.9	
33	Fifteen miles south of Peluse river.....	10	Sunset	28.0	....	......	......	....	....	
		11	Sunrise	....	27.186	33	32	27.165	2,744.2	
34	Lapwai, at Mr. W. Craig's...............	11	Sunset	25.0	....	......	......	....	....	
		12	Sunrise......	....	28.882	36	34	....	....	
		12	2 p. m.......	....	28.846	40	38	....	....	
		12	Sunset	....	28.856	37	37	....	....	
		13	Sunrise......	....	28.700	30	29	....	....	
		13	2 p. m.......	....	28.570	37	35	....	....	
		13	Sunset	....	28.536	36	35	....	....	
		14	Sunrise......	....	28.586	34	33	28.716	1,240.5	
35	Down Lapwai, at forks of stream	14	Sunset	4.0	28.754	36	34	....	....	
		15	Sunrise......	....	28.664	29	27	28.721	1,234.5	Snow.
36	Fork of Clearwater and Snake rivers....	15	Sunset	12.0	29.288	34	32	....	....	
		16	Sunrise......	....	29.462	29	29	29.385	612.1	
37	Alpahwah creek, five miles from its mouth	16	Sunset	14.0	28.854	32	31	....	....	
		17	Sunrise......	....	28.618	34	32	28.748	1,207.0	Two inches of snow during the night.
38	In cañon, half mile up from the trail....	17	Sunset	20.5	28.434	41	40	....	....	
		18	Sunrise......	....	28.464	41	40	28.440	1,512.7	
39	Touchet river, at fork..................	18	Sunset	13.0	27.958	46	46	....	....	
		19	Sunrise......	....	27.878	44	42	27.900	2,045.9	
40	Dry creek, half mile above trail.........	19	Sunset	18.5	28.086	47	45	....	....	
		20	Sunrise......	....	28.410	37	35	28.237	1,708.6	
41	Walla-Walla river, right bank, opposite to the Mission.	20	Sunset	14.0	29.110	42	41	....	....	
		21	Sunrise.....	....	28.744	39	38	....	....	
		21	2 p. m.......	....	28.914	39	37	....	....	
		21	Sunset	....	28.906	32	32	....	....	
		22	Sunrise......	....	29.536	2	2	....	....	
		22	2 p. m.......	....	29.636	12	9	....	....	
		22	Sunset	....	....	......	......	....	....	
		23	Sunrise......	....	....	......	......	....	....	
		23	2 p. m.......	....	29.772	11	7	....	....	
		23	Sunset	....	29.762	2	— 3	....	....	
		24	Sunrise......	....	29.768	......	—17	29.411	579.3	

APPENDIX A—Continued.

No. corresponding to profile.	Locality.	Date.	Hour.	Distance between stations.	Barometer reading, (No. 1006.)	Attached thermometer.	Detached thermometer.	Mean corrected barometer.	Altitudes.	Remarks.
		1855.		*Miles.*	*Inches.*	°	°	*Inches.*	*Feet.*	
42	Tamallamp creek	Dec. 24	Sunset	4.0	29.500	6	2	....	....	
		25	Sunrise	....	29.540	......	−15	....	....	
		25	2 p. m.	....	29.550	6	1	....	....	
		25	Sunset	....	29.492	......	−14	....	....	
		26	Sunrise	....	29.286	......	−13	....	....	
		26	2 p. m.	....	29.216	− 1	− 3	....	....	
		26	Sunset	....	29.150	− 5	− 5	....	....	
		27	Sunrise	....	29.078	− 2	+ 1	....	....	
		27	2 p. m.	....	29.138	10	7	....	....	Snowing.
		27	Sunset	....	29.156	5	4	....	....	
		28	Sunrise	....	29.550	1	0	....	....	
		28	2 p. m.	....	29.660	21	16	....	....	
		28	Sunset	....	29.636	3	1	....	....	
		29	Sunrise	....	29.766	3	3	....	....	
		29	2 p. m.	....	29.758	20	9	....	....	
		29	Sunset	....	29.694	0	− 2	....	....	
		30	Sunrise	....	29.524	......	−11	....	....	
		30	2 p. m.	....	29.540	16	9	....	....	
		30	Sunset	....	29.482	0	− 3	....	....	
		31	Sunrise	....	29.390	4	2	....	....	
		31	2 p. m.	....	29.464	20	13	....	....	
		31	Sunset	....	29.454	10	8	....	....	
		1856.								
		Jan. 1	Sunrise	....	29.330	12	11	....	....	
		1	2 p. m.	....	29.294	20	15	....	....	
		1	Sunset	....	29.300	14	12	....	....	
		2	Sunrise	....	29.516	15	11	....	....	
		2	2 p. m.	....	29.256	21	19	....	....	
		2	Sunset	....	29.256	21	17	....	....	
		3	Sunrise	....	29.228	39	38	....	....	
		3	2 p. m.	....	29.234	41	39	....	....	
		3	Sunset	....	29.230	39	38	....	....	
		4	Sunrise	....	29.232	43	43	29.460	532.3	From a mean of observations.
43	Wild Horse creek	4	Sunset	12.0	28.256	41	40	....	....	
		5	Sunrise	....	28.234	39	38	28.240	1,704.0	
44	Umatilla river, left bank	5	Sunset	15.0	28.950	41	39	....	....	
		6	Sunrise	....	28.962	42	41	28.955	1,020.5	
45	Down Umatilla river, left bank, 6 miles above agency.	6	Sunset	18.0	29.518	41	37	....	....	
		7	Sunrise	....	29.358	33	30	29.418	583.2	
46	Butter creek, 6 miles above crossing of wagon road.	7	Sunset	14.0	28.970	32	30	29.018	952.0	Snowing at 3 p. m.

APPENDIX A—Continued.

Observations taken by Mr. James Doty, on a survey from Fort Benton, via Sun river and eastern base of the Rocky mountains, to Birch river, in May, 1854. No. of instrument, 776.

Number of station.	Locality.	Date.	Hour.	Distance between stations.	Corrected barometer reading.	Attached thermometer.	Detached thermometer.	Mean corrected barometer and thermometer.	Altitude.	Remarks.
		1854.		*Miles.*	*Inches.*	°	°		*Feet.*	
1	Big Coulée	May 11	6 a. m.......	11.50	27.174	39	32	27 097	....	
		11	9½ a. m......	....	27.020	61	62	40°	2,863.0	
2	Great Falls..........	12	Sunrise.....	25.00	26.816	42	42	26.781	....	
		12	9 a. m.......	....	26.745	60	58	51°	2,979.0	
3	....	12	12 m........	......	26.320	59	58	26.320	3,481.7	
4	....	12	Sunset	16.00	26.435	53	48	....	....	
		13	Sunrise......	....	26.397	40	40	26.438	....	
		13	9 a. m......	....	26.481	60	63	37°.3	3,474.0	
5	....	13	2 p. m.......	....	26.402	65	62	26.402	3,484.0	
6	....	13	Sunset	22.00	26.276	52	52	....	....	
		14	Sunrise......	....	26 442	46	45	....	....	
		14	2 p. m.......	....	26.426	65	62	....	....	
		15	Sunrise......	....	26.593	34	33	26.374	....	
		15	9 a. m......	....	26.521	61	58	44°	3,592.0	
7	....	15	Sunset	20.00	26.215	48	46	....	....	
		16	Sunrise......	....	26.323	39	38	26.112	....	
		16	9 a. m.......	....	26.304	72.5	68	40°	3,789.0	
8	....	16	2 p. m.......	....	25.966	74	70	25.966	4,265.2	
9	....	16	Sunset	23.00	25.996	55	56	....	....	
		17	Sunrise	....	26.027	46	46	26.237	....	
		17	9 a. m.......	....	26.001	67	64	52°	3,765.7	
10	....	17	2 p. m......	....	25.594	80	79	91°	4,482.9	
11	Sun River valley, in the mountains; lat. of camp, 47° 32′ 39″.	17	Sunset	12.50	25.621	58	59	....	....	
		18	Sunrise	....	25.252	40	40	....	....	
		18	2 p. m.......	....	25.632	67	65	....	....	
		18	Sunset	....	23.628	53	52	25.478	....	
		19	Sunrise......	....	25.604	45	44	55°	....	
		19	9 a. m......	....	25.733	60	60	....	4,594.0	
12	....	19	2 p. m.......	....	25.138	65	62	72°	5,165.4	
13	Teton valley, near mountains	19	Sunset	20.50	25.349	58	58	....	....	
		20	Sunrise......	....	25.392	39	38	25.085	....	
		20	9 a. m.......	....	25.308	64	60	47°	4,984.0	
		20	2 p. m.......	....	25.285	81	76	84½°	4,896.7	
14	....	20	Sunset	20.50	25.124	59	61	....	....	
15	....	21	Sunrise......	....	25.141	61	60	25.162	....	
		21	9 a. m......	....	25.137	77	76	68°	5,008.0	
		21	2 p. m.......	6.00	25.267	76	74	....	....	
16	Birch river..........	21	9 p. m.......	....	25.777	53	53	25.523	....	
		22	Sunrise......	....	25.316	54	52	67°	4,602.6	

APPENDIX A—Continued.

Observations taken by ——— —————, on a trip from Fort Benton, via Teton and Dearborn rivers, through Lewis and Clark's Pass, in September, 1854. No. of instrument, 776.

Number of station.	Locality.	Date.	Hour.	Distance between stations.	Corrected barometer reading.	Attached thermometer.	Detached thermometer.	Mean corrected barometer.	Altitude.	Remarks.
		1854.		*Miles.*	*Inches.*	°	°	*Inches.*	*Feet.*	
1	On plain	Sept. 7	11 a. m	....	27.202	58	57	27.142	2,840.8	
2	Camp Teton valley	8	5¾ a. m	....	26.845	48	50	....	....	
		8	8 a. m	....	26.833	52	53	26.792	3,202.3	
3	....	8	2 p. m	....	26.267	72	68	26.248	3,773.6	
4	Teton valley	8	6½ p. m	....	26.497	55	55	....	....	
		9	5¾ a. m	....	26.488	47	46	26.487	3,520.9	
5	....	9	2 p. m	....	26.205	76	73	26.297	3,721.7	
6	Camp	9	5 p. m	....	26.205	64	64	....	....	
		9	6½ p. m	....	26.235	55	56	....	....	
		10	5¾ a. m	....	26.390	43	42	26.323	3,694.2	
7	....	10	12 m	....	26.065	65	60	26.090	3,942.0	
8	....	10	6½ p. m	....	26.119	48	48	....	....	
		11	5¾ a. m	....	26.122	38	38	26.169	3,857.8	
9	....	11	11 a. m	....	25.692	63	56	25.743	4,315.1	
10	....	11	2 p. m	....	25.896	70	71	25.972	4,068.1	
11	....	11	3 p. m	....	25.737	65	62	25.830	4,221.1	
12	....	11	5 p. m	....	25.146	58	55	25.226	4,879.2	
13	Camp Dearborn river	12	Sunrise	....	25.457	34	36	....	....	
		12	7 a. m	....	25.429	37	37	25.494	4,585.7	
14	....	12	8 a. m	2	25.112	57	57	25.176	4,935.4	
15	....	12	8½ a. m	3	25.141	61	61	25.204	4,904.6	
16	....	12	9 a. m	4	25.026	62	61	25.079	5,032.5	
17	....	12	9½ a. m	5	25.008	60	63	25.078	5,044.2	
18	Summit of Lewis and Clark's Pass	12	1 p. m	13	23.664	50	48	23.716	6,536.7	
19	Valley at creek	12	2 p. m	....	24.532	54	55	24.573	5,588.2	
20	....	12	6½ p. m	....	24.955	45	45	....	....	
		13	7 a. m	....	25.032	39	38	25.061	5,063.0	
21	....	13	2 p. m	....	25.516	64	62	25.465	4,617.4	
22	....	13	6½ p. m	....	25.610	45	44	....	....	
		14	5¾ a. m	....	25.654	30	30	25.576	4,496.3	
23	....	14	2 p. m	....	25.888	82	72	25.920	4,124.1	
24	....	14	6½ p. m	....	26.163	53	52	....	....	
		15	5¾ a. m	....	26.250	41	40	26.263	3,758.2	
25	....	15	6½ p. m	....	26.633	56	60	....	....	
		16	7 a. m	....	26.633	50	50	26.597	3,409.7	
26	....	16	6½ p. m	....	26.612	52	52	....	....	
		17	7 a. m	....	26.683	44	43	26.588	3,415.4	
27	....	17	6½ p. m	....	26.426	57	58	26.315	3,702.9	

APPENDIX B.

METEOROLOGICAL REGISTER.

No. correspond-ing to profile.	Locality.	Date.		Barometer corrected.			Open air thermometer.			Cloudiness in tenths.			Wind—direction and force.			Daily remarks on the weather.
				7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	
		1854.														
1	Fort Owen, Bitter Root valley.	Oct.	2	26.713	26.695	26 820	47.8	63.5	56.0	2	4	0	0	W. 2..	0	Cool in the morning and evening; floating clouds.
			3	26.821	26.635	26.607	40.5	65.5	50.0	0	0	1	0	E. 1...	0	Clear and pleasant.
			4	26.514	26.312	26.332	37.5	69 0	52 0	0	3	0	0	W. 3..	0	Cool and pleasant; somewhat hazy.
			5	26.571	26.344	26.350	40.5	56.0	53.5	6	8	9	W. 2..	W. 1..	0	Cloudy; rain with high wind at 10 a. m.
			6	26 563	26.682	26.723	44.0	46.5	44.0	4	10	10	E. 1..	0	0	Rain fell last night in the valley and snow in the mountains; rain since 6 p. m.; cool.
			7	26.763	26.775	26.732	42.0	43.0	37.0	10	10	10	0	E. 2..	W. 1	Showery during the morning; snowing in the mountains; rain.
			8	26.878	26.882	26.870	40.5	45.0	36.5	10	3	0	0	0	0	Cleared off at 10 a. m.; clear and cool at 9 p. m.
			9	…	…	26.364	…	…	46 0	…	…	10	…	…	0	Raining since 6 p. m.; showery.
			10	26.352	26.386	26.546	45.0	53.5	46.0	10	8	2	0	W. 2..	0	Showery; raining in the mountains to the west; clear at 9 p. m.
			11	26.596	26.580	26.577	41.0	53.0	42.5	4	5	2	0	E. 1..	0	Floating clouds during the day; clear and cool at 9 p. m.
			12	26.628	26.633	…	32.5	48.0	…	0	6	…	0	NE 1..	…	Foggy, and heavy fro t in the morning; variable.
			13	…	…	…	…	…	…	…	…	…	…	…	…	Cloudy weather; heavy frosts at night; cold during the day.
			14	…	…	…	…	…	…	…	…	…	…	…	…	Do. do. do.
			15	…	…	…	…	…	…	…	…	…	…	…	…	Do. do. do.
			16	26.776	26.669	26.606	31.0	48.0	40.0	0	0	0	0	NE. 1..	0	Clear and cool; heavy frost.
			17	26.612	26.610	26.626	37.0	57.5	34 5	3	4	0	0	NE. 2..	0	Light fleecy clouds.
			18	26.635	26.657	26.696	39.0	50.0	38.5	7	3	0	E. 1	E. 1..	E. 1..	Showery at 10 a. m.
			19	26.733	26.714	26.685	35.5	46.5	43.0	…	1	0	E. 1..	E. 1.	0	Dense fog in the morning; few floating clouds during day; 9 p. m. clear.
			20	26.694	26.684	26.694	36.0	53.5	39.0	…	1	0	0	E. 1..	E. 1..	Foggy; clear and pleasant.
			21	26.699	…	…	33.0	…	…	10	…	…	W. 1..	…	…	Clouds high.
			22	…	…	…	…	…	…	…	…	…	…	…	…	Rain and snow; not very cold. Absent to visit the Pend d'Oreilles.
			23	…	…	…	…	…	…	…	…	…	…	…	…	Do. do. do.
			24	…	…	…	…	…	…	…	…	…	…	…	…	Do. do. do.
			25	…	…	…	…	…	…	…	…	…	…	…	…	Do. do. do.
			26	…	…	…	…	…	…	…	…	…	…	…	…	Do. do. do.
			27	26.574	26.602	26.629	42.5	47.0	36.5	7	8	0	W. 1..	W. 3..	0	Broken clouds; clear and cool.
			28	26.641	26.611	26.616	39.0	45.0	41.0	10	10	10	NE. 1..	NE. 1..	NE. 1	Cloudy and damp in the morning; rained fast all afternoon and evening.
			29	26.645	26.712	26.956	39.0	46.0	36.0	9	2	3	0	N. 1..	0	Heavy rain all night; cleared off mild and pleasant.
			30	27.123	27.128	27.158	33.0	41.5	33.0	2	1	0	0	W. 1..	W. 1..	Clear, cool, and pleasant.
			31	27.133	27.069	27.083	30.0	45.0	35.0	6	3	0	SE. 2	NW. 1..	0	Clouds high and fleecy.
	Means…	…		26.698	26.669	26.683	38.4	51.25	42.9	…	…	…	…	…	…	
	Monthly mean.	…		…	26.683	…	…	44.2	…	…	…	…	…	…	…	

No. corresponding to profile.	Locality.	Date.	Barometer corrected.			Open air thermometer.			Cloudiness in tenths			Wind—direction and force.			Daily remarks on the weather.
			7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	
		1854.													
1	Fort Owen, Bitter Root valley	Nov. 1	26.970	26.851	26.829	32.5	45.5	37.0	0	4	0	0	E. 1...	0	Clouds high and fleecy; heavy frost during the night.
		2	26.832	26.818	26.826	29.0	45.5	38.0	0	2	0	0	0	E. 1...	Pleasant.
		3	26.921	....	....	30.0	....	....	4	....	....	0	....	....	Cloudy over the mountains.
		4	....	....	....	....	....	....	....	....	....	....	....	....	During these three days the weather has been clear and cool, with dense fogs until 10 a. m.
		5	....	....	....	....	....	....	....	....	....	....	....	....	
		6	....	....	....	....	....	....	....	....	....	....	....	....	
		7	26.740	26.586	26.525	27.0	44.0	35.0	0	0	0	0	0	0	Very heavy frost last night; fleecy clouds in the west at sundown.
		8	26.581	26.498	26 579	30.0	43.0	39.0	6	7	5	W. 2...	W. 1...	W. 1...	Slight showers of rain and snow during the forenoon.
		9	26.713	26 724	26.740	31.0	41.0	35.0	4	5	7	W. 1...	SW. 3.	W. 1...	A half inch of snow fell last night.
		10	26.636	26.586	26 599	38.0	42.0	38.0	10	6	2	E. 1...	W. 5..	W. 1...	Slight fall of snow in forenoon.
		11	26.792	26.824	26.839	31.0	41.0	31.0	0	0	0	W. 1...	SW. 3.	0	Atmosphere hazy.
		12	26.840	26.790	26.812	22.0	41.0	27.0	1	0	2	0	E. 1...	E. 1...	
		13	26.790	26.795	26.825	22.5	44.0	28.0	0	0	0	E. 1...	NW. 1.	0	
		14	26 917	26.864	26.879	25.0	43.0	29.0	0	0	0	W. 1...	E. 1...	0	Somewhat hazy.
		15	26.898	26.857	26.876	25.0	40.5	31.0	0	2	0	W. 1...	NE. 1.	0	Pleasant.
		16	26.905	26.893	26 902	24.0	39.5	31.5	4	3	0	SW. 1.	1	W. 1..	Wind light and shifting.
		17	26.910	26.882	26.896	26.5	41.0	30.0	2	0	0	NW. 1.	NW. 1	0	Do.
		18	26.749	26.607	26.562	24.5	41.0	32.0	0	3	6	N. 1...	N. 1...	NE. 1.	Heavy frost last night.
		19	26.592	26.592	26.615	30.5	40.0	44.5	10	5	10	NE. 3..	E. 1...	NE. 2.	Snow in the mountains; slight showers during forenoon; wind squally.
		20	26.757	26.749	26.735	34.5	43.0	38.0	10	10	10	E. 1...	N. 1...	E. 2...	Snowing in the mountains.
		21	26.554	26.487	26.413	49.0	54.0	51.0	8	8	0	S. 3...	SW. 2.	S. 1...	Atmosphere damp; clear in the evening.
		22	26.371	26.340	26.389	49.0	49.0	45.0	7	10	10	S. 1...	SW. 2.	SW. 3.	Cloudy over the mountains; showery in the forenoon; wind squally.
		23	26.623	26.601	26.594	38.5	43.0	36.5	10	10	10	SE. 2..	S. 4...	S. 1....	Snowing in the mountains; snowing in the valley since dark.
		24	26.686	26.862	27.058	39.5	43.0	32.0	8	5	0	W. 2...	NE. 2.	E. 1...	Clouds breaking away; clear and cool in the evening.
		25	27.119	26.951	26.991	26.0	34.0	28.0	0	0	0	SW. 1	0	S. 1...	Heavy frost last night; very pleasant during the day.
		26	26.792	26.687	26.754	27.5	31.0	33.0	1	5	0	0	E. 2...	0	Snow squall in forenoon.
		27	26.891	26.762	26.750	24.0	35 0	32.0	0	8	3	0	N. 1...	N. 1...	Heavy frost; appearance of snow in mountains.
		28	26.665	26.677	26.687	38.0	44.0	36.5	10	9	2	S.SE. 2.	NE. 2..	N. 1...	Raining; squally last night.
		29	26.689	26.730	26.830	31.5	40.0	31.0	2	3	0	0	NW. 1.	0	Cool and pleasant.
		30	26.999	26.984	26.943	26.0	32.0	24.0	0	0	0	0	NW. 1.	W. 1..	Clear and cool; heavy frost last night.
	Means	....	26.774	26.731	26.752	30.8	42.0	34.3	....	....	....	....	....	....	
	Monthly mean	....	....	26.752	....	....	35.7	....	....	....	....	....	....	....	

APPENDIX B—Continued.

No. correspond-ing to profile.	Locality.	Date.	Barometer corrected.			Open air thermometer.			Cloudiness in tenths.			Wind—direction and force.			Daily remarks on the weather.
			7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	
1	Fort Owen, Bitter Root valley	1854. Dec. 1	26.666	26.556	26.684	20.0	35.0	33.5	8	10	8	0	NW. 3.	0	High gusts of wind, accompanied by snow; ceased snowing at 7 p. m.
		2	....	....	26.815	....	....	24.5	....	....	0	....	....	0	Clear and pleasant.
		3	26.780	26.661	26.668	18.5	25.0	21.5	0	10	10	0	0	0	Cloudy, with appearance of snow.
		4	26.869	26.842	26.859	15.0	26.0	19.0	0	0	0	0	0	0	Clear and cool.
		5	26.927	26.720	26.848	18.5	27.5	20.0	1	1	2	0	0	0	Clear and pleasant.
		6	26.854	26.765	26.831	15.0	34.5	21.0	4	2	3	0	0	0	Clear and cold.
		7	26.808	26 766	26.763	12.0	27.0	24.5	2	5	9	SW. 1.	NW. 1.	0	Cloudy; appearance of snow.
		8	26.815	26.804	26.876	20.0	34.0	25.5	0	6	8	E. 1. .	N. 1...	0	Clouds light.
		9	26.883	26.893	26.948	12.5	29.0	17.0	3	4	4	E. 1...	0	0	Clear, cool, and pleasant.
		10	26.997	27.012	27.029	13.5	25.0	25.5	8	10	10	0	0	0	Appearance of snow.
		11	27.096	27.035	....	21.0	37.5	....	3	1	....	0	N. 1. .	....	Cool.
		12	26.915	26.891	....	20.5	34.0	....	4	4	....	NE. 1..	NE. 1 .	....	Fleecy clouds.
		13	26.908	....	....	22.0	....	....	7	....	....	0	....	......	Do.
		14	26.872	26.883	26.896	34.5	44.0	30.5	0	0	0	N. 1...	NE. 1 .	0	Very pleasant and mild.
		15	26.907	26.810	28.832	34.0	41.5	42.0	8	4	0	W. 1..	NE. 1 .	E. 2...	Slight shower in the morning; wind shifting.
		16	26.839	26.873	....	29.5	41.0	....	4	4	....	W. 1..	NE. 3 .	....	Clouds broken.
		17	27.026	27.023	26.996	23.0	29.5	21.0	4	2	0	E. 1...	0	0	High clouds.
		18	27.038	27.015	26.966	13.5	26.0	17.0	0	0	0	SE. 1..	NE. 1 .	0	
		19	27 025	26.975	27.100	11.5	23.0	11.5	0	0	0	SE. 1..	NE. 1 .	0	
		20	26.808	26.860	26.872	10.0	16.5	11.0	10	0	0	N. 1...	N. 1...	E. 1...	Heavy frost last night; snowed only a little.
		21	26.804	26.671	26.606	12.0	19.0	21.5	0	10	5	0	N. 1...	NE. 2..	Clear in the morning; snowed enough during the evening to cover the ground.
		22	26.696	26.688	26.678	23.0	34.0	31.0	4	10	0	W. 1..	N. 2...	S. 1...	Clouded up this morning, but cleared off by evening.
		23	26.572	26.504	26 524	40.0	45.0	39.0	10	10	3	N. 2...	SW. 2.	0	Rained this morning; showery during forenoon.
		24	26.522	26.492	26.489	37.5	42.5	37.0	10	10	10	N. 1...	SW. 2.	NE. 1 .	Showery all day.
		25	26.209	26.271	26.368	36.0	38.0	34.0	10	10	0	N. 1...	NE. 2..	0	Heavy wind from NW., with shower at 10 a. m.; cleared off at 8 p. m.
		26	26.262	26.307	26.370	35.0	32.0	31.0	10	10	5	E. 1...	W. 3...	W. 3...	Cloudy in the morning; snow fell to ½ inch in depth in afternoon; clearing up 9 p. m.
		27	26.591	26.590	26.578	32.0	33.0	32.5	3	10	10	SW. 4	SW. 4..	W. 4 ..	Strong SW. wind last night; snowing lightly at 9 p. m.
		28	26.667	26.618	26.585	35.0	39.0	40.5	10	5	3	W. 4..	W. 3...	W. 5...	Snowed all night; moonlight 9 p. m.
		29	26.522	26.454	26.461	46.5	51.0	45.5	7	4	6	SW. 3.	SW. 3	SW. 5 .	Windy, with drifting clouds.
		30	26.418	26.407	26 419	46.0	46.5	42.5	10	5	5	SW. 3.	SW. 4 .	W. 3...	High wind last night; cloudy to day.
		31	26.366	26.372	26.336	40.5	43.5	33.0	10	10	10	E. 1..	S. 2...	E. 1...	Snowing at 9 p. m.
	Means	....	26.758	26.716	26.718	24.9	33.8	27.9	....	....	....	....	....	....	
	Monthly mean	....	....	26.731	....	....	28.9	....	....	....	....	....	....	....	

No. corresponding to profile.	Locality.	Date.	Barometer corrected.			Open air thermometer.			Cloudiness in tenths.			Wind—direction and force.			Daily remarks on the weather.
			7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	
		1855.													
1	Fort Owen, Bitter Root valley	Jan. 1	26.118	26.881	26.009	30.5	29.0	29.5	10	10	10	....	NE. 2..	N.NE.2.	Snowing; depth of snow four inches at 9 p. m.
		2	26.321	26.315	26.444	18.0	24.0	3.0	3	3	2	SW. 1.	SE. 1..	E. 1...	
		3	26.281	26.336	26.376	16.0	16.5	11.5	5	5	10	NE. 1..	N. 1...	N. 1...	Cloudy; snowing slowly at night.
		4	26.073	26.003	26.115	11.5	11.5	6.0	10	10	5	....	....	....	Snowing fast.
		5	26.270	26.047	26.460	3.0	9.5	8.5	10	6	2	....	....	....	Snowing slowly in the morning. Starlight, 9 p. m.
		6	26.520	26.440	26.404	12.5	23.5	24.0	4	10	10	SW. 2.	SW. 2.	S.SW.2.	Hazy in the morning.
		7	26.402	26.248	26.474	27.5	33 0	31.5	10	5	10	S.SW.4.	S.SW.3.	S.SW.1.	Snowing, 9 p. m.
		8	26.619	26.646	26.658	34.0	37.0	31.5	4	9	2	E. 2....	E.SE.2.	S. 1...	
		9	26.643	26.596	26.772	36.5	39.5	40.0	10	8	2	SW. 2..	0	0	Rained this morning; snow all gone. Clear, 9 p. m.
		10	26.757	26.658	26.612	44.0	46.5	39.5	10	7	6	SW. 2..	SW. 2.	S.SW.3.	
		11	26.522	26.380	26.558	44.0	47.5	37.0	10	3	0	S.SW.3.	S.SW.3.	0	High wind; squalls of rain.
		12	26.762	26.876	26.930	29.0	34.0	28.5	2	2	0	0	W. 1...	0	Slight fall of snow last night.
		13	26.900	26.804	26.707	22.0	31.0	28.5	2	5	2	0	E. 1...	0	
		14	26.607	26.654	26.687	39.5	42.0	33.0	10	10	2	S.SW.3.	S.SW.1.	0	
		15	26.433	26.351	26.438	39.5	40.5	38.0	10	10	0	S SW.1.	S.SW.2.	S SW.4.	Rainy. Clear, 9. p. m.
		16	26.639	26.628	26.640	34.0	38.0	32.5	8	6	3	S.SW.2.	SE. 1..	0	Slight fall of snow.
		17	26.533	26.443	26.347	37.0	38.5	43.0	10	10	10	SW. 2.	S. 2....	SW. 3.	Raining slowly since daylight.
		18	26.330	26.413	26.395	32.0	38.0	28.0	2	3	10	SW. 2.	SW. 2.	0	High wind last night. Began snowing, 7 p. m.
		19	26.344	26.287	26.366	25.5	26.0	26.0	10	10	8	0	0	S.SW.2.	Snowing.
		20	26.621	26.613	26.656	24.5	27.5	25.0	2	7	5	S.SW.1.	S.SW.2.	0	
		21	....	26.516	26.358	....	28.5	32.5	....	10	10	....	S.SW.1.	0	Snowing in the morning; raining, 9 p. m.
		22	26.323	26.412	26.449	38.0	41.0	40.0	10	10	6	S.SW.2.	SW. 2.	0	Snowing fast; rained during the night; cleared up this afternoon.
		23	26.551	26.538	26.557	47.5	50.5	45.0	10	4	4	S.SW.2	S SW.1.	S.SW.1.	Hazy.
		24	26.644	....	26.957	44.5	....	34.5	6	....	0	0	... .	0	Light fleecy clouds; moonlight to-night.
		25	26.992	26.916	26.774	28.0	41.5	31.0	0	2	8	0	0	0	
		26	26.703	26.702	26.728	44.5	50.5	32.5	6	4	0	S.SW.1.	N. 2...	S. 1....	Winds gusty.
		27	26.752	26.740	26.736	32.0	39.0	32.0	0	0	0	NE. 1..	NE. 1.	S. 1....	Very pleasant.
		28	26.738	26.718	26.740	27.5	42.0	32.0	0	0	0	0	E. 1...	E. 1....	Heavy frost last night.
		29	26.746	26.728	26.753	32.0	40.0	30.0	0	0	0	E. 1...	NE. 1..	SE. 1..	
		30	26.742	26.728	26.755	24.0	44.0	29.0	0	0	0	0	0	0	
		31	26.859	26.851	26.698	24.5	42.5	25 0	0	0	0	NE. 2..	0	0	
	Means	....	26.599	26.549	26.566	30.1	35.1	30.4	....	....	....	....	....	....	
	Monthly mean................	....	....	25.558	....	....	31.9	....	....	....	....	....	....	....	

No. corresponding to profile.	Locality.	Date.	Barometer corrected.			Open air thermometer.			Cloudiness in tenths.			Wind—direction and force.			Daily remarks on the weather.
			7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	
		1855.													
	Fort Owen, Bitter Root valley.....	Feb. 1	26.658	26.682	26.785	24.5	37.5	26.5	0	0	0	0	0	0	
		2	26.758	26.717	26.741	25.0	36.0	29.5	0	0	2	NE. 1...	0	0	
		3	26.844	26.812	26.772	27.0	39.0	32.0	0	8	6	0	0	0	Heavy frost; light hazy clouds.
		4	26.765	26.772	26.766	36.5	39.5	48.0	10	10	8	N. 1.....	0	0	Rained slowly from 9 a. m. to 3 p. m.
		5	26.762	26.635	26.477	40.0	52.0	35.0	5	3	2	0	N. 1.....	0	Fair.
		6	26.352	26.311	26.420	41.5	51.0	42.0	6	5	4	0	S.SW. 2..	0	
		7	26.545	26.542	26.646	35.0	46.0	30.0	8	2	0	0	S.SW. 1..	0	
		8	26.654	....	26.833	27.5	....	30.5	5	....	0	SW. 1...	....	0	Snowed for a few moments at mid-day.
		9	26.647	26.600	26.629	29.0	36.0	42.5	10	10	10	0	0	0	Snowed in the morning, but turned into a drizzling rain in the afternoon.
		10	26.541	26.368	26.251	34.0	41.0	36.5	10	10	10	0	0	0	Drizzling rain.
		11	26.286	26.333	....	39.0	41.5	....	10	8	....	S.SW. 2.	S.SW. 2..	0	Cleared up in the afternoon.
		12	26.500	26.499	26.521	36.0	42.5	38.0	8	10	2	0	S SW. 3..	S.SW. 1..	Cool, raw wind.
		13	26.604	26.762	26.866	36.0	42.0	30.5	7	6	0	0	S.SW. 1..	0	Squalls of snow and rain.
		14	26.910	26.875	26.754	32.0	43.0	32.0	0	1	0	0	S SW. 2..	0	
		15	26.679	26.744	26.812	38.0	40.5	35.5	6	9	10	S.SW. 2.	S SW. 3..	0	Heavy squalls of wind and rain; slightly drizzling rain at 9 p. m.
		16	27.049	27.101	27.124	29.0	39.0	27.5	2	2	0	0	0	0	
		17	27.086	27.007	26.801	31.0	34.0	29.0	6	10	4	0	E. 1.....	0	Clouded up, but cleared off again towards evening.
		18	26.574	26.474	26.484	37.5	40.0	32.0	7	10	0	S.SW 2..	W.NW. 3.	0	
		19	26.544	26.562	26.711	32.5	32.5	12.5	10	10	10	NE. 2...	N. 2.....	NE. 2...	Snowing in the morning, stopped about 10 a. m.
		20	26.863	26.758	26.604	6.5	12.5	1.5	0	0	0	NE. 2...	NE. 2...	N NW. 3.	Gusts of wind during the night.
		21	26.672	26.558	26.590	5.0	17.5	12.5	5	3	4	0	NE. 2...	NE. 3...	
		22	26.613	26.597	26.589	4.5	12.0	13.0	4	5	2	NE. 1...	E. 1.....	0	High wind last night.
		23	26.574	26.378	26.508	14.0	25.5	23.5	7	2	2	0	0	NE. 2...	
		24	26.611	26.674	26.808	14.0	20.0	8.5	8	0	2	N.NW. 2.	N.NW. 3.	N.NW. 3.	
		25	26.879	26.750	26.718	7.0	19.0	12.5	0	3	2	0	0	0	
		26	26.633	26.489	26.514	6.0	33.5	28.5	0	0	4	0	0	W. 2....	
		27	26.586	26.616	26.657	30.5	46.5	29.0	8	2	0	0	W. 1....	0	Cloudy, but pleasant.
		28	26.692	26.602	26.515	24.0	41.0	35.0	10	6	5	0	0	0	Light clouds.
	Means	....	26.674	26.658	26.663	26.5	35.0	29.0	....	....	....	....	....	....	
	Monthly mean................	....	....	26.665	....	....	30.3	....	....	....	....	....	....	....	

No. corresponding to profile.	Locality.	Date.	Barometer corrected.			Open air thermometer.			Cloudiness in tenths.			Wind—direction and force.			Daily remarks on the weather.
			7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	
		1854.													
1	Fort Owen, Bitter Root valley....	March 1	26.490	26.576	26.754	36.0	49.0	40.5	10	10	7	0	0	W. 2....	Raining slowly.
		2	26.836	26.668	26.723	39.0	53.0	38.0	4	2	2	0	SW. 1...	0	Hazy.
		3	26.553	26.545	26.573	40.0	51.0	38.0	3	6	2	0	SW. 1...	0	Squalls of wind during the morning.
		4	26.554	26.511	....	45.0	50.0	....	8	6	....	SW. 2...	SW. 2...	....	Squalls of wind and rain.
		5	26.295	26.260	....	45.0	52.5	39.5	7	8	4	SW. 2...	SW. 2...	S.SW. 5.	Do. do.
		6	26.506	26.452	26.458	42.5	53.5	42.0	2	10	10	0	0	0	Violent wind last night; commenced raining at sunset.
		7	26.603	26.431	26.550	44.5	51.5	41.0	10	3	0	0	W. 5....	0	Stopped raining about 9 a. m.
		8	26.584	26.568	26.523	87.5	51.0	46.0	0	8	10	0	S.SW. 2.	0	Clouded up this afternoon; squally.
		9	26.555	26.452	26.448	42.5	51.0	36.5	10	4	0	S. 1.....	NE. 1..	0	Light rain all night.
		10	26.451	26.375	26.415	35.0	45.5	34.5	0	6	10	0	N. 1.....	0	Scattering flakes of snow this afternoon.
		11	26.406	26.371	26.415	29.5	33.0	31.5	10	10	0	0	N. 1.....	0	Ceased snowing at 5 p. m., 1½ inches in depth.
		12	26.464	26.362	26.278	25.5	37.0	29.5	2	4	2	0	0	0	Clear.
		13	26.152	26.130	26.213	27.0	34.0	24.0	10	10	5	0	NE. 1...	S. 1. ...	Snowing in the mountains; squalls of wind and snow 9 p. m.
		14	26.417	26.387	26.384	23.0	30.5	26.5	8	8	10	0	0	0	Squalls of snow during the day.
		15	26.386	26.402	26.495	25.5	31.5	28.0	8	10	10	0	NE. 2...	0	Snowing in the mountains; snowing in valley since 4 p. m.
		16	26.578	26.585	26.558	24.0	29.0	19.0	10	10	2	0	W. 2....	0	Cloudy; cleared off in the evening.
		17	26.745	26.708	26.706	22.0	31.5	25.0	2	5	0	0	0	0	Light clouds.
		18	26.733	26.657	26.613	24.5	44.5	35.5	0	0	0	0	W. 2....	W. 2....	Delightful weather.
		19	26 697	26.678	26.762	30.0	47.5	38.0	0	1	2	0	W. 2....	0	Do.
		20	26.781	26.697	26.727	40.0	51.0	37.0	3	3	2	0	W. 2....	W. 2...	Do.
		21	26.939	26.907	26.881	37.0	52.0	34.0	2	0	0	0	0	0	
		22	26.915	....	26.842	34.0	....	36.0	0	....	0	0	....	0	
		23	26.913	26.850	26.850	34.0	61.0	45.0	0	0	2	0	N. 1.....	0	
		24	26.893	26.845	26.760	32.0	60.0	40.0	0	4	3	0	0	0	
		25	26.786	26.727	26.865	36.0	57.0	36.0	5	3	2	0	N. 2.....	W. 2....	Very pleasant.
		26	26.927	26.849	26.817	25.5	48.0	33.0	0	0	0	0	0	0	Hazy.
		27	26.898	26.707	26.727	21.0	54.0	41.0	0	0	0	0	N. 1.....	N. 1.....	
		28	26.787	26.720	26.727	26.0	52.0	29.5	0	0	0	0	0	0	
		29	....	26.718	26.574	....	58.0	42.0	....	0	0	....	S. 1.....	0	
		30	26.517	26.501	26.433	32.0	48.0	46.0	8	8	8	N. 1.....	NE. 1...	0	Appearance of rain; sprinkling at 9 p. m.
		31	26.371	26.252	26.105	33.5	54.0	48.0	2	2	8	0	0	0	Showers of rain in the evening; clear during the day.
	Means	....	26.624	26.563	26.592	33.0	44.0	36.0	....	....	....	....	....	....	
	Monthly mean.............	....	....	26.593	....	....	37.7	....	....	....	....	....	....	....	

APPENDIX B—Continued.

No. corresponding to profile.	Locality.	Date.	Barometer corrected.			Open air thermometer.			Cloudiness in tenths.			Wind—direction and force.			Daily remarks on the weather.
			7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	
		1855.													
1	Fort Owen, Bitter Root valley....	April 1	26.204	26.225	26.299	39.5	47.0	38.0	3	4	2	0	NE. 1...	0	Squalls of rain during the afternoon; thunder at 4 p. m.
		2	26.612	26.625	26.671	41.0	44.0	34.5	2	4	2	W. 2....	SW. 3...	0	Squalls of wind and snow this afternoon.
		3	26.747	26 876	26.964	29.0	45.5	36.0	3	5	2	0	0	0	Squalls of wind and snow at intervals.
		4	27.058	27.051	27.014	27.0	52.0	35.0	0	0	0	0	0	0	
		5	....	26.910	26.895	....	50.0	43.0	....	0	0	....	0	0	
		6	26.826	26.657	25.691	41.5	62.0	57.0	5	6	2	0	S.SW. 3..	S.SW. 2..	Squalls of wind and rain until sunset.
		7	26.704	26.630	26.624	48.0	56.5	47.0	5	2	2	0	NW. 2...	NW. 1...	Pleasant.
		8	26.625	26.514	26.564	44.0	53.0	37.5	1	3	0	NW. 2..	NW. 2...	0	Windy last night, and to-day ceased at sunset.
		9	26.588	26.478	26 386	36.0	57.5	44.0	0	0	0	0	SE. 1....	SE. 1...	
		10	26.360	26.248	26.315	41.0	54.0	44.5	10	6	10	0	NE. 1...	0	Showery during forenoon.
		11	26.266	26.210	26.240	43.5	49.5	45.0	10	10	3	0	0	0	Rain since noon; heavy shower at sunset.
		12	26.582	26.609	26.694	41.0	47.0	38.5	4	0	2	0	W. 1....	W. 1....	Squally during the night.
		13	26.721	....	26.586	30.0	....	40.0	0	....	2	0	....	0	Clear.
		14	26.734	26.566	26.542	40.0	58.0	44.0	0	0	0	0	W. 1....	0	
		15	26.628	26.329	26.348	33.5	60.5	49.0	0	3	8	0	S. 2.....	W. 1....	Clouds in large masses.
		16	26.333	....	....	40.0	....	....	0	....	....	0	....	....	
	Means....................	....	26.599	26.572	26.589	38.3	52.6	42.2	....	....	....	....	....	....	
	Monthly mean..............	....	....	26.587	....	....	44.4	....	....	....	....	....	....	....	

No. corresponding to profile.	Locality.	Date.	Barometer corrected.				Open air thermometer.				Cloudiness in tenths.			Wind—direction and force.			Daily remarks on the weather.
			Sunrise.	2 p. m.	Sunset.	Daily mean	Sunrise.	2 p. m.	Sunset.	Daily mean.	Sunrise.	2 p. m.	Sunset.	Sunrise.	2 p. m.	Sunset.	
		1855.															
1	Camp Stevens, Walla-Walla valley.	June 1	....	....	....	....	......	......	......	......	......	......	......	....	....	....	
		2	....	....	....	....	......	......	......	......	......	......	......	....	....	....	
		3	....	....	....	....	......	......	......	......	......	......	......	....	....	....	
		4	....	....	....	....	......	......	......	......	......	......	......	....	....	....	
		5	....	....	....	....	......	......	......	......	......	......	......	....	....	....	
		6	28.603	28.500	28.512	28.538	51	83	67	67	4	4	6	S. 1......	NE. 1....	N. 1....	
		7	28.510	28.434	28.449	28.464	56	74	68	66	7	9	6	0	SW. 1...	SE. 1....	
		8	28.696	28.548	28.574	28.606	53	76	65	64.7	1	4	4	SW. 1 ...	E. 1.....	E. 1	
		9	28.643	28.409	28.434	28.495	51	88	73	70.7	0	1	1	W. 6. S. 1.	0	0	
		10	28.547	28.499	28.442	28.496	61	89	75	75.0	2	3	8	0	0	0	Dark clouds southwest.
		11	28.360	28.286	28.407	28.351	64	89	72	75	8	5	7	0	0	E. 1	
		12	28.430	28.227	28.340	28.332	56	81	59	65.3	8	8	10	S. 1......	....	W. 1.....	Rain since 4 o'clock.
		13	28.495	28.776	28.816	28.696	50	53	53	52	10	10	9	SW. 6...	W. by S. 2.	W. by S. 1.	Rain ceased at sunset.
		14	28.879	28.663	28.637	28.726	49	66	57	57	4	4	2	W. 1.....	S. 1	0	
		15	28.663	28.509	28.537	28.569	50	68	57	58.3	1	7	9	0	W. 1.....	0	
		16	28.593	28.582	28.302	28.392	51	62	47	53.3	8	9	9	S. 1	S. 1	0	
		17	28.252	....	....	28.252	52	......	......	52	9	......	......	S. 1	....	....	

APPENDIX B—Continued.

No. corresponding to profile.	Locality.	Date.	Barometer corrected.				Open air thermometer.				Cloudiness in tenths			Wind—direction and force			Daily remarks on the weather.
			Sunrise.	2 p. m.	Sunset.	Daily mean.	Sunrise.	2 p. m.	Sunset.	Daily mean.	Sunrise.	2 p. m.	Sunset.	Sunrise.	2 p. m.	Sunset.	
		1855.															
48	Camp at Bitter Root, Treaty Ground.	July 1	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		2	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		3	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		4	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		5	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		6	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		7	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		8	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		9	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		10	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		11	......	26.906	26.864	26.885	......	89	73	81	......	4	5	......	S. 1 ...	0	Clear.
		12	26.901	26.813	26.778	26.831	48	93	84	75	5	5	0	E. 1...	W. 7..	W. 3..	Very strong wind; gusts commenced at 1½ p. m.
		13	26.768	26.589	26.585	26.647	54	92	80	75.3	8	6	3	W. 1..	W. 6..	W. 3..	Wind in gusts in the afternoon.
		14	26.576	26.525	26.541	26.544	46	78	66	63.3	3	3	2	E. 1...	W. 7..	N. 1...	Mild, with strong gusts of wind.
		15	26.603	26.724	26.739	26.689	50	66	58	58	5	8	2	N. 2 ..	W. 6..	E. 1...	Foggy at sunrise; strong wind since 7 a. m.
		16	26.810	26.704	26.705	26.740	36	81	64	60.3	......	5	5	E. 1...	W. 2.	E. 2...	Thick fog until an hour after sunrise; broken clouds during the day.
		17	26.836	26.862	26.880	26.859	49	79	71	66	6	6	1	E. 1...	N. 5...	W. 1..	Broken clouds; misty in the mountains to the SE.
		18	27.027	......	......	27.027	42	......	......	42	1	......	......	0	......	......	Very foggy at sunrise.
		19	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		20	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		21	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		22	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		23	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		24	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		25	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		26	......	......	......	......	......	......	......	......	......	......	......	......	......	......	Teton.
101	Camp at Teton river	27	......	......	27.200	......	......	......	61	......	......	......	2	......	......	N. 1...	Pleasant.
		28	27.182	27.202	27.206	27.197	49	67	57	57.7	7	8	1	S. 1...	SW. 4	0	Slight rain at 8 a. m.; appearance of a heavy thunder shower at 2½.
		29	27.153	27.016	26.962	27.044	40	82	63	61.7	2	1	1	0	W. 1 .	0	Foggy in morning; pleasant during the day.
		30	27.051	26.986	27.023	27.020	51	84	71	68.7	0	2	2	W. 1 ..	N. 4.	N. 4...	Gusty; compact clouds all around the horizon.
		31	27.137	26.118	27.159	27.138	49	68	60	59	1	9	9	0	N. 4...	NE. 4..	Lower clouds are dark and broken; upper clouds are light.

No. corresponding to profile.	Locality.	Date.	Barometer corrected.				Open air thermometer.				Cloudiness in tenths.			Wind—direction and force.			Daily remarks on the weather.
			Sunrise.	2 p. m.	Sunset.	Daily mean.	Sunrise.	2 p. m.	Sunset.	Daily mean.	Sunrise.	2 p. m.	Sunset.	Sunrise.	2 p. m.	Sunset.	
		1854.															
113	Camp on the Teton river, two miles from Fort Benton.	Aug. 1	27.057	27.090	27.157	27.101	51	62	56	56.3	10	9	10	0	N. 4...	N. 7...	Slow rain in the morning; rained again in the evening.
		2	27.238	27.262	27.282	27.261	54	67	59	60	10	5	0	0	NE. 1	0	Rain ceased at sunrise; clear and warm at 2 p. m.
		3	27.311	27.198	27.191	27.233	52	78	71	67	5	5	1	E. 1..	E. 4...	E. 3...	Warm and windy.
		4	27.208	27.098	27.080	27.126	49	88	73	70	0	6	4	0	0	0	Foggy this morning; thunder shower after sunset.
		5	27.137	27.161	27.024	27.107	50	83	69	67 3	1	2	2	W. 1..	0	0	Warm and pleasant.
		6	27.t51	26.9'3	27.102	27.022	55	76	50	63.3	5	5	9	0	N. 5...	SW. 4.	Wind and rain from 4 to 6 p. m.
		7	27.153	27.142	27.148	27.148	52	73	60	61.7	2	2	8	SW. 5.	S. 1...	N. 4...	Thunder shower at 9 p. m.
		8	27.210	27.131	28.065	27.135	54	75	65	64.3	2	3	7	W. 2..	E. 2...	0	
		9	27.034	26 990	26 992	27.005	59	68	56	61	9	6	9	N. 1...	N. 4...	N. 1...	Raining at 5 p. m.; thundering in the north.
		10	27.134	27.114	27.123	27.124	45	57	51	51	10	5	2	N 5...	N. 3...	0	Rained last night; some rain at 11 a. m.
		11	27.129	27.088	26.922	27.046	43	65	55	54.3	4	3	2	0	E 1...	0	Weather changeable to-day.
		12	27.146	27.230	27.212	27.196	45	65.8	60	66.9	9	6	8	0	N. 2...	0	
		13	27.292	27.324	27.288	29.301	51	64.5	58	57.8	9	9	10	NE. 2	NW. 1.	NW. 2.	Rained last night.
		14	27.292	27.286	27.263	27.280	50	61	59	56.6	10	10	3	W. 1 .	NW. 1.	N. 1...	Few drops of rain this morning.
		15	27.247	27.214	27.371	27.277	46	74	55.5	58.5	4	6	8	W. 1..	N. 1...	NE. 6.	Strong wind during the day.
		16	27.386	27.346	27.264	27.332	39	71.5	67	59.2	0	0	0	0	E 1...	NE. 1.	
		17	27.290	27.198	27.070	27.193	44	80	70	64.6	0	0	2	0	0	E. 1...	
		18	27.032	26.852	26.973	26.952	55	85	70	70	0	0	1	0	N.NE.1.	0	Hazy during the day.
		19	27.214	27.145	27.235	27.198	55	67	53	58.3	9	5	1	N.NE.3	N. 4...	N. 1...	Several loose pieces of glass in the tube of the barometer.
		20	27.322	27.246	27.234	27.267	50	74	66	63 3	10	0	0	S. 1...	N by E.1	E. 2...	Hazy atmosphere.
		21	27.241	27.143	27.132	27.172	43	86	65	63.6	1	0	2	0	W. 1..	NE. 1 .	
114	Missouri river, ½ mile above Fort Benton.	22	27.177	27.279	27.263	27.239	52	76	67	65	1	1	2	S. by W.1	E. 1...	E. 1...	
		23	27.281	27.279	27.252	27.371	52	79	68	66.3	3	1	3	E. 1...	NE. 2 .	E. 3...	Hazy.
		24	27.142	27.260	27.356	27.253	55	62	50	55.7	3	6	9	0	W.SW.5	W. 2..	Slight rain at 4 p. m.
		25	27.365	27.202	27.169	27.265	42	68	61	57	9	1	4	E. 2...	E. 6...	E. 6...	Cold and windy all day.
		26	27.315	27.326	27.316	27.319	42	74	68	61.3	1	0	6	E. 1...	E by N.1	E. 1...	Hazy.
		27	27.350	27.173	27.147	27.223	44	81	71	65.3	1	0	1	S. 1...	E. 1...	NE. 1 .	Id.
		28	27.284	27.221	27.209	27.238	48	71	62	60.3	2	0	1	N. 1...	NE. 2 .	NE. 3	
		29	27.207	27.092	27.106	27.135	53	69	60	60.7	9	3	4	E. 1...	E. 2...	E. 3...	
		30	27.105	27.146	27.139	27.130	53	55	52	53.3	10	10	2	NW. 1.	SW. 3.	S. 5...	Rain since 12½ p. m.; clear and windy at sunset.
		31	27.233	....	....	....	47	......	......	47	1	......	......	S. 4...	....	....	Windy last night.

No. corresponding to profile.	Locality.	Date.	Barometer corrected.				Open air thermometer.				Cloudiness in tenths.			Wind—direction and force.			Daily remarks on the weather.
			Sunrise.	2 p. m.	Sunset.	Daily mean.	Sunrise.	2 p. m.	Sunset.	Daily mean.	Sunrise.	2 p. m.	Sunset.	Sunrise.	2 p. m.	Sunset.	
		1855.															
114	Missouri river, ½ mile above Fort Benton.	Sept. 1	......	......	......	......	......	......	......	......	......	......	..	......	......	......	
		2	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		3	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		4	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		5	......	......	27.290	......	......	......	59	......	......	......	1	......	......	S. 1.....	Clear and pleasant.
		6	27.337	27.328	27.327	27.331	52	60	52	54.7	10	1	1	E. 1....	E. 3.....	SW. 1...	Slight rain in the morning; cleared off at 12 m.
		7	27.261	27.260	27.295	27.272	53	76	65	64.7	8	1	1	SW. 5...	W.SW.6.	W. by S.2.	Cool, cloudy, and windy in the morning; clear and pleasant at night.
		8	27.357	27.203	27.142	27.234	42	86	57	65	0	0	0	SW. 1...	SW. 1...	E. 1.....	Bright and pleasant.
		9	27.264	27.158	27.158	27.193	48	67	64	59.7	1	3	8	SW. 2...	N. 1.....	N. 1.....	Clouds in the horizon during the day; concentrating into one mass at 9 p. m.
		10	27.201	27.366	27.447	27.338	52	54	46	50.7	8	9	4	W. 2	0	W. 6	Raining at daylight until sunrise; some rain at 8a.m.
		11	27.504	27.492	27.396	27.464	43	27.5	49	39.8	10	1	0	NE. 1 ...	NW. 1...	N. 1.....	Dark and cold this morning.
		12	27.327	27.173	27.208	27.236	32	71	59	54	1	1	1	S. by E. 1.	N. 1.....	N. 1.....	Bright and pleasant.
		13	27.394	......	27.324	27.359	42	......	47	44.5	10	......	1	W. 1...	......	NW. 1..	
		14	27.355	27.168	27.183	27.235	24	59	51	44.7	8	7	4	E. 4.....	N. 1	NE. 3...	
		15	27.220	27.043	27.040	27.101	40	66	59	55	9	9	10	SE. 1....	NE. by N.5	0	Wind ceased at sunset.
		16	27.007	27.022	27.074	27.034	47	58	53	52.6	10	10	5	W. 1...	SW. by S. 4	W. by S. 4	Cloudy, with cold wind; clearing off at 9 p. m.
		17	27.191	27.311	27.341	27.281	47	47	46	46.6	10	10	10	W.SW. 1.	NE. 6	NE. 6..	Rain this morning ceased about sunrise; squally during the day.
		18	27.448	27.396	27.411	27.418	35	38	36	39.3	10	10	10	N. 6.....	NE. by N 6	E. 4.....	Snowed at 6½ a. m.; changed into a slow rain, which ceased before sunset.
		19	27.324	27.214	27.208	27.249	33	56	50	46.3	8	9	9	NW. 1 ..	S. 4.....	S. 4.....	Misty, and appears to be clearing off this morning.
		20	27.205	27.150	27.147	27.167	34	70	57	53.7	1	4	2	E. 1.....	SW. 5...	SW. 1...	Wind blew from 6½ a. m. until about 4 p. m.
		21	27.202	27.130	27.114	27.149	40	67	55	54	1	7	9	0	W. 2	NW. 2 ..	A few drops of rain after sunset.
		22	27.211	27.141	27.216	27.189	43	62	52	52.3	4	3	5	SW. 1...	SW. 4...	W. 5...	Wind ceased after sunset; clouds in large masses during the day.
		23	27.251	27.072	27.005	27.109	27	65	56	49.3	0	2	5	0	E. 3.....	E. 1. ...	Thin and light clouds towards the horizon.
		24	27.001	27.112	27.220	27.111	52	65	55	57.3	9	5	2	SW. 6...	W. by S. 6	W. 6....	Overcast in the morning; scattering clouds during the day.
		25	27.550	27.555	27.491	27.532	44	61	52	52.3	1	1	1	W. 5 ...	W. 1	E. 1.....	
		26	27.337	27.103	27.048	27.163	32	80	69	60.3	0	1	1	0	S. by W. 5	SW. 4...	Wind since 9 a. m.
		27	26.892	26.805	26.912	26.869	45	67	55	55.7	7	9	8	0	W. by S. 7	0	A few drops of rain at 2 p. m.; gusts of wind from 2 to 4.
		28	27.233	27.224	27.203	27.220	41	57	51	49.7	9	7	5	SW. 4...	SW. 2...	W. 1....	Rained last night.
		29	27.108	27.046	27.069	27.074	50	65	58	57.7	6	6	9	SW. 4..	SW. 6...	SW. 5...	Raining at sunset.
		30	27.397	27.407	27.351	27.385	43	65	56	54.7	9	8	5	W. 1....	W. 2....	W. 1.....	

No. corresponding to profile.	Locality.	Date.	Barometer corrected.				Open air thermometer.				Cloudiness in tenths.			Wind—direction and force.			Daily remarks on the weather.
			Sunrise.	2 p. m.	Sunset.	Daily mean.	Sunrise.	2 p. m.	Sunset.	Daily mean.	Sunrise.	2 p. m.	Sunset.	Sunrise.	2 p. m.	Sunset.	
		1855.															
114	Missouri river, ¼ mile above Fort Benton.	Oct. 1	27.382	27.283	27.274	27.313	50	76	64	63.3	2	1	1	SW. 1...	SW. 4...	W. 1	Missouri, ¼ mile up river from Fort Benton.
		2	27.247	27.040	26.984	27.090	45	84	68	65.7	2	2	3	0	W. 5....	W. 2....	
		3	27.331	27.296	27.351	27 326	42	48	41	43.7	10	9	9	W. 1	N. 2.....	N. 4.....	Raining this morning.
		4	27.494	27.432	27.464	27.463	26	45	34	35	1	5	2	W. 4....	W. 5....	S. 4	Rained slowly last night; bright and cold this morning.
		5	27.520	27.389	27.367	27.425	17	53	46	38.7	2	3	10	0	SW. 2 ...	0	
		6	27.346	27.262	27.211	27.273	39	72	57	56	0	1	2	SW. 4...	S. 6, W. 5.	SW. 2...	
		7	27.333	27.203	27.203	27.246	37	81	66	61.3	1	0	0	0	S. 6, W. 5.	S. 6, W. 3.	Clear and pleasant.
		8	27.216	27.084	27.119	27.140	40	83	71	64.3	0	2	9	E. 1.....	SW. 5...	W. 5	
		9	27.213	27.308	27.438	27.320	42	68	58	56	1	5	6	SE. 1....	W. 6....	N. 5.....	
		10	27.815	......	......	......	31	......	......	......	2	......	......	E. 1.....	......	......	
		11	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		12	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		13	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		14	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		15	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		16	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		17	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		18	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		19	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		20	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		21	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		22	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		23	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		24	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		25	......	......	......	......	......	......	......	......	......	......	......	......	......	......	
		26	27.225	27.126	27.102	27.151	52	66	61	......	2	5	4	W. 6	W. 7	W. 6	Clouds are high, thin, and scattered.
		27	27.332	27.178	27.140	27.217	40	55	56	......	4	5	5	S. 1.....	N. 1.....	N. 1.....	
3	Teton river, 14 miles from Fort Benton.	28	26.984	......	27.124	......	61	......	32	......	9	......	10	S. 6...	......	N. 5.....	Snow storm at sunset.
4	Teton river, 31½ miles from Fort Benton.	29	27.218	......	27.773	......	12	......	29	......	......	......	6	E. 1.....	......	S. 2....	Two and a half inches of snow fell last night; foggy this morning.
		30	27.497	27.661	27.706	27.621	43	40	38	......	2	2	2	S. 1.....	W. 6....	W. 4....	
		31	27.764	27.717	27.696	27.726	35	51	45	......	1	2	10	SW. 5...	SW. 5 ..	S. 5.....	Clouded up at sunset.

No. corresponding to profile.	Locality.	Date.	Barometer corrected.				Open air thermometer.				Cloudiness in tenths.			Wind—direction and force.			Daily remarks on the weather.
			Sunrise.	2 p. m.	Sunset.	Daily mean.	Sunrise.	2 p. m.	Sunset.	Daily mean.	Sunrise.	2 p. m.	Sunset.	Sunrise.	2 p. m.	Sunset.	
		1855.															
4	Teton river, 31½ miles from Fort Benton.	Nov. 1	27.584	27.584	27.652	27.607	39	50	40	43	1	9	9	SW. 6...	NW. 4. .	N. 3....	
		2	27.077	27.027	26.964	27.023	28	38	34	33.3	4	1	1	W. 3	SW. 4...	S. 4....	One inch of snow fell last night.
		3	26.739	26.534	26.495	26.589	33	50	43	42	2	2	4	S. 6, W. 6.	S. 6	S. 6.....	
		4	26.568	....	26.591	26.386	36	......	28	32	9	......	2	NW. 4 ..	....	W. 4....	
		5	26.473	....	....	....	13	......	......	......	0	......	......	0	....	....	

ALPHABETICAL INDEX.

A.

Page.

Abnormal corrections, tables of 355
Abnormal oscillations 354
Adams, Mr. Thomas, aid 33
sent to examine the Bois de Sioux river 54
Adams, Mount 135
Admiralty Head 284
Inlet 257, 280-288
entrance 282
Agatha's Passage 287
Agricultural products of Red River valley 325, 326
Russia 324
Aguayo, Isla de 301
Alara, Cape 268
Puerto 268
Alexander, Pend d'Oreille Chief 211
Allan Island 300
Point 293
Almerantzago, Canal del 282
Alpawah river 181, 198, 255
Alpawaha creek 198
Altitudes 352-358
Amelia, Lake 36
Anderson Island 290
Angeles, Puerto de los 278
Angels, the Harbor of the 278
Antelopes 103, 118, 119
Apple Cove 287
Argus Bay 300
Armstrong, Camp 95
Arnold, Lieutenant, U. S. A, detailed 107
completes the military road in Washington Territory 190-193
in charge of the depot at St. Mary's village 110
leaves Vancouver 107
ordered to ascend the Columbia river 146
trip from Clark's Fork to Walla-Walla 159-160
Ariel's Point 284
Arrow river 123, 174, 238
Assiniboine, Camp 73
derivation of the word 76
Indians 86
distribution of presents to the 87
talk with the 74-76
river 233
Atahnam river 141, 255
Atahuane Mission 139
Atchison, Camp 91

B.

Page.

Baadah Point 277
Badger river 186, 237
Bad Water Lake 111
Bainbridge Island 287
Baker, Mount 306
Baker's Bay 156
Bald Hillock creek 61
Barnes's Island 298
Barometers 32, 42, 190, 196, 352
Barometrical Observations 196, 203, 209, 213, 214, 218, 220
computation of altitudes from 352-358
Bastida, Punta de la 265
Bastion, Point of the 265
Bay, Argus 300
Baker's 156
Bellingham 158, 301
Birch 304
Callam 277
Chlayarnat 280
Commencement 286
Crescent 277
Duncan's 293
Dwamish 286
Elliott's 286
False Dungeness 277
Freshwater 271, 278
Gaston 301
Georgian 257
Gurriere 297
Heath 290
Holmes's 293
Isfuat 277
Neeah 158, 276
New Dungeness 278
Oak 283
Padilla 300
Penguin 300
Queenhithe 266
Quimper's 278
Rodd 290
Shoalwater 156, 158, 258, 262
Sinclair's 301
Strawberry 301
Ucunas 278
Useless 265, 285
Bayfield 228

Page.
Bear's Paw Mountains 97, 112, 173, 236
Bear's Teeth 178
Beaver creek 119, 215
Beaver Lodge creek 61
Belland, guide 43, 50
Bellevue Island 297
Bellingham Bay 158, 301
Bellingham Channel 301
Bell's Lake 52
Belly Prairie 213, 223, 339
Belly river 186, 219, 236
Belt Mountains 98, 123
Belt Mountain creek 164, 239
Benton, Fort 101, 164, 174, 176, 183, 186, 217
greatest cold in January, 1854 311
temperature at 319
Berthold, Fort 81
Bertodano, Enseñada de 279
Bertodano's Inlet 279
Big Blackfoot Fork 125
river 186, 210, 244
Big Hole Mountain 168, 247
Pass 243, 247
Prairie 169, 172, 243
Big Knees 183, 239
Big Muddy river 82, 88, 236
Big Stone Lake 229
Birch Bay 304
river 237
altitudes at 358
Bird Tail Rock 119, 222, 239
Bitter Root Mountains 180, 224, 228, 243
river 121, 131, 165, 168, 175, 204, 243, 245
crossing the 131
Valley 110, 130, 165, 169, 172, 175, 178, 181, 205–209, 220, 223, 243, 339
altitudes of the 357
climate of the 326, 329
Blackfeet Indians 88, 91, 98, 102, 181
council with, at Fort Benton 115, 116
Blackfoot Cañon 211
Council 182, 218–222
Fork 122
country along the 110
Pass 132, 183
Prairie 121, 223
river 120, 168, 213
valley of the 120, 211–214
trail 119
Black Hills 241
of Nebraska 171
river 159, 258
Blakely Island 298
Port 287
Blake's Island 288
Blanca, Rio de Florida 305
Blancho, Rio 305
Blood Indians 115
Blue Mountains 152, 197, 252, 254, 257
Thunder, Indian Chief 73

Page.
Blunt's Island 272
Boats, India-rubber 42
Bois de Chippewas 233
Sioux river 54, 79, 83, 229, 231
bridge crossing of the 333
Bonilla Islands 272
Islas de 272
Boonville 80
Boque d'Otard 239
Bouilla Point 270
Boulieau, Henry 41
trip to Messrs. Lander and Tinkham 43
Paul 44
Boutineau, Pierre, guide 41
Bow Lake 185
river 114, 218
Box Elder creek 97, 98, 218
spring near 98
Breast river 186, 237
Brown, Point 265
Brown's Falls 39
Bruce Channel 289
Buckland's Rapids 251
Budd's Inlet 290
Buffaloes 60, 66, 72, 123
near Lake Jessie 59
Bullfinch Harbor 264
Burrard's Canal 306
Burr, Mr. F. H., aid 33
Burrow's Island 300
Butter creek 257
Butte de Morale 68, 84
Maison du Chien 68
Micheau 58
Buttes near the Big Muddy river 89

C.

Caamona, Bocas de 282
Inlet 282
Island 293
Cabinet, the 109, 161, 246
Cadotte's Pass 101, 175, 183, 186, 216, 222, 247, 337
greatest cold in January, 1854 311
remarks of Mr. Doty upon 177
Calhoun Lake 39
Callam Bay 277
Campbell, Fort 102
steamboat Robert 79, 82
Camp Armstrong 95
Atchison 91
Davis 41
Guthrie 58
Marcy 49
McClelland 55
Pierce 36, 53, 83
regulations 42, 51, 90, 91
Stevens 189
Washington 148
Canal, Almerantzago 282
Burrard's 306

Page.
Canal, De Haro 158, 294
Fidalgo's 299
Guemes 301
Hood's 159, 257, 284
Sault St. Mary's 227
Welland 227
Canil, Rio 277
Canoe river 250
Cañon of Hell Gate 121
Cantonment Loring 170
Stevens 165, 168, 176, 177, 181, 187
Cape Alara 268
Church 271
Classett 266
Disappointment 263
Flattery 261, 266, 268, 271
Foulweather 268
George 279
Hancock 262
Horn 155
Mendocino 268
Shoalwater 262
Tatooche 269
Western 277
Carmelo, La Montaña del 306
Carrassco, Isla de 280
Carrassco's Island 280
Carr's Inlet 289
Cascade Mountains 144, 160, 194, 228, 250, 257
arable lands 253, 256, 257
botany of 144, 145
characteristics of 228
exploration by Capt. McClellan 137, 138
lakes of 253
Cascades of the Columbia 107, 155, 162, 250
Case's Inlet 289
Cathlapootle river 138, 258
Cavilaer, Mr 55
Cayuse Indians 108
Cedar river 167, 259
Cesseda, Peninsula de 305
Punta de 305
Ceusto, Rio de 277
Chachamicah Island 280
Challam Point 279
Champagne, Baptiste, voyageur 107, 118
Channel, Bellingham 301
Bruce 289
Crawford 290
Kelisut 283
Ringgold's 299
Ryder 290
Chauncy's Island 298
Cheguos 138
Chehalis river 157, 158, 258, 264
Upper 194
Valley 194
Chelan, Lake 255
river 143, 255
Chemakane Mission 147, 201
Valley 148, 254

Page.
Chief Mountain 185
Lake 185, 236
Chippewa river 51
Chirouse, Father 152
Chismil river 277
Chlayarnat Bay 280
Church at the Pend d'Oreille Mission 162
Cape 276
Citadel Hill 98
Rock 173, 218, 220
Clarke, Mr., in charge of Fort Benton 99
Clark, Fort 81
Clark's Island 298
Fork 127, 135, 159, 161, 172, 175, 178, 245, 248, 252
snow at 313
valley of 109, 246
Lake 178
Classet 267
Cape 267
Clearwater river 166, 180, 252
Coarse Bread, the river of 277
Coast Mountains 194
Cœur d'Aléne Indians 133, 200, 224
Lake 135, 175, 187, 200, 201, 253
Guts of the 200
Mission 133, 187, 197, 201, 224
Mountains 132, 187, 228, 243
or Stevens's Pass 132, 179, 248
prairie 109, 135, 200, 254
river, barometrical observations at the 135, 187, 200, 201, 224, 252, 344, 357
valley 202, 254
Cohoxolockny, Nez Percés Chief 125
Cold as an obstruction to the Railroad Route 307-311
average, at different localities 307
Spring 41, 45
Stream 45
Tables of greatest 308-311
Colicee Inlet 285
Columbia, Great Plain of the 142, 160, 228, 250
river 142, 159, 162, 188, 194, 201, 227, 250
Lewis Fork of the 170
navigability of the 250, 251
Pass 346
Valley 154, 194
Colville, Fort 136, 144, 162
Point 298
Valley 148, 254
Commencement Bay 286
Computation of altitudes from barometrical observations 352-358
Conception, Point 266, 268
Cone Islands 301
Constitution, Mount 296
Contents, Computation of Altitudes, Tables of Heights and Distances, Meteorological Register 26
Geographical Memoir 25
Narrative of 1853 19

Page.
Contents, Narrative of 1855 24
Railroad Report and Estimate 26
Coon creek, bridge crossing at 332
Cooper, Dr. J. G., Surgeon and Naturalist 32, 137
Co-palûx river 156
Coriacan defile 220, 245
Côteau des Prairies 83, 231
described by Nicollet 231
du Missouri 69, 232
Council at the Spokane 224
Bluff's City 80
with the Blackfeet Indians at Fort Benton 115, 116
Country about the Yellowstone and its tributaries 104
along the Blackfoot Fork 110
between Fort Pierre and Fort Union 104
between Fort Union and the Big Muddy river 89
between the Columbia river and the Cascade Mountains 141
between the divide of the Rocky Mountains and the divide of the Bitter Root Mountains 249, 250
from the Bois de Sioux to the Wild Rice river 54
Cowlitz river 155, 194, 258
Cracon-du-Nez 222
Craven Island 283
Crawford Channel 290
Cray-fish creek 150
Crees Indians 96
Crescent Bay 277
Crow Indians 86, 98, 99, 106
river 229
Crown Butte 119, 183, 222, 239
creek 238, 337
Crow-Wing river 46, 228
Culbertson, Mr. Alexander, accounts on Indians 96
his qualifications 34, 86
instructions to 35
Cumming, Colonel 218
Cut Bank river 184
Cypress Island 301
Mountain 96, 112, 114, 115

D.

Dahap Inlet 285
Dahl, Mr., engagement of 37
Dalles, the 107, 142, 161, 250, 257
Dana's Passage 289
Dauphin's Rapid 174, 235
David, Lake 45
Davila Inlet 278
Davis, Camp 41
Davis, Mr., meteorological observer 50
Dead Colt Hillock 79, 231
Dearborn river 119, 122, 165, 175, 216, 222, 237, 238, 337
bridge crossing of 338
Valley 216
Decatur's Island 298
Deception Gulf 304

Page.
Deception Island 293
Passage 291, 293
Deep river 124
Deer hunting near the Cœur d'Alêne Mission 134
Lodge creek 125
Defiance, Point 288
De Fuca Straits 158, 257, 270–276
De Haro Archipelago 294–298
Canal 158, 294
De Lara's Gulf 303
De L'Orme, Governor, of Selkirk Traders 70
De Rosario Straits 158
De Smet, Father 171, 201
Oregon Missions 86
Des Chutes river 108, 251, 257, 258
Delacour, Father 55
Denig, Mr., in charge of Fort Union 78
Description of country from Camp Pierce to the Bois de Sioux river 53
Deseados, Islas los 267
Destruction Island 266
Devil's Lake 232
Dinsey, Point 297
Disappointment, Cape 263
Discovery, Port 279
Distance from Fort Benton to Fort Union 101
Mouse river to Fort Union 84
St. Paul to Fort Union 83
the Platte to Fort Pierre 81
Weston to St. Joseph 81
Divide of the Rocky Mountains 119
Dog river 174, 235
teams of the Piegan Indians 115
Dolores, Isla de 266
Donelson, Lieutenant A. J., U. S. A., detailed 33
at the Teton river 105
camp near Blackfoot river 120
description of the Missouri from St. Louis to Fort Benton 80–82
exploration of the country about Fort Union 82
instructions to 34
sent to Cypress Mountains 87
orders changed 89
starts for Jocko river and Clark's Fork 127
tour along Milk river 103
Doty, Mr. James, instructions to 38
instructions to, at Fort Benton 113
meteorological observations at Camp Guthrie 58
remarks upon Cadotte's Pass 177
summary of operations 183–189
tribute to 117
trip to the Saskatchawan 218
Drayton Pass 290
Dry creek 197, 255
Du Barry, Lieutenant Beekman, U. S. A., detailed 33
instructions to 34
changed 37
placed in charge of meteorological observations 44

Page.
Du Barry, Lieutenant Beekman, U. S. A., relieved, to report in Washington city 47
sent to the Red River trail 39
Duck Island 298
Duncan, Lieutenant J. K., U. S. A., detailed 32
tour to the Upper Yakima river 140
Duncan's Bay 293
Rock 268, 270
Dun's Rock 300
Duntze Island 289
Rock 270
Dwamish Bay 286
Lake 167
river 258
Dyes Inlet 287

E.

Eagle Chief, a Gros Ventres 92
Harbor 287
Ediz Hook 278
Edmund, Point 286
Edmund's Group 298
Elbow Lake 52
Elder creek 111
Eld Inlet 289
Elisa's Island 302
Elk river 40, 183, 216, 219, 237, 337
bridge crossing of 332
Elliott's Bay 286
Elm river 231
Elokamin river 157
Emptenum river 255
En-cha-rae-nae creek 151
En-chush-chesh-she-luxum Lake 150
Engano, Enseñada del 304
Enteatkwu river 143, 255
Erie, Mount 300
Evans, Dr. John, geologist 33
instructions to 33, 35
tour from Fort Union to Fort Benton 104
Evans, Mr. Elwood, aid 33
Everett, Mr. T. S., quartermaster's clerk 33
relieved and sent to Washington city 87
sent to the Red River trail 39

F.

False Dungeness Bay 277
Fidalgo, Boca de 282
Island 300
Fidalgo's Canal 299
Cove 277
Fight between the Blackfeet, Gros Ventres, and Crows 98
Gros Ventres and Crows 99
Finissiant, Flathead Chief 125, 126
Fisgard Island 289
Flathead Fort 128
Indians 110, 124, 128, 181, 209, 220
conference with the 125, 126
Kamas Prairie of the 187, 211

Page.
Flathead Lake 132, 164, 178, 246
river 164, 178, 220, 245
valley 164
trail 119
treaty 209
village 110
Flattery, Cape 261, 266, 268, 271
Rocks 266
Flat Top Island 297
Flint creek 244
Flon, Boca de 282, 293
Fond du Lac 229
Foost Island 298
Fort Benton 101, 164, 174, 176, 183, 186, 217
Berthold 81
Campbell 102
Clark 81
Colville 136, 144, 162
Flathead 128
Garry 229
Hall 168, 170, 181
McKenzie 106
Nisqually 290
Okinakane 142, 144
Owen 122, 172, 175, 181, 186, 223
Pierre 81
Steilacoom 139, 190
Union 83, 85
Walla-Walla 108, 152, 181, 190
William 229
Foulweather Bluff 284
Cape 268
Fourth of July, celebration of the 57
Fox Island 290
Francis, Brother 162
Point 302
Fraser's river 227, 305
Freemann's Island 297
Freshwater Bay 271, 278
Frolic Strait 298

G.

Gallatin Fork 234, 238
Gamble, Port 284
Gardiner, Captain J. W. T., U. S. A., detailed 33
instructions to 34
relieved 38
Gardner, Port 293
Garry, Fort 229
temperature at 319
Spokane Chief 109, 136, 148, 168, 172
Garzon, Enseñada de 304
Gaston Bay 301
Gulf 302
Seno de 302
Gate of the Mountains 124, 176, 178, 234, 237
Gates of Sun river 243
Gazzoli, Pere 133
Gedney's Island 292
General Conclusions (Meteorology) 331

Page.
General review of country from the Bois de Sioux to Fort Benton 83-85
Geographical Memoir 226-307
George, Cape 279
Georgia, Gulf of 303
Georgian Bay 257
Gibbs, Mr. George, ethnologist 32, 146, 148
report on the geology of Shoalwater Bay 156-158
tour to the mouth of the Yakima 140
Girdle Mountains 123, 239
Gold between the Cascades and the Columbia 257
in the Yakima valley 140
on Clark's Fork and about Colville 254
on the Nachess river 257
Goose's Neck 119
Gordon Islands 298
Point 290
Gourd Island 298
Grades between the Milk and Missouri rivers 104
Gradients 337-339, 341, 342, 343
Gradual Descent, the river of 277
Graham, Mr. William M., astronomer 33
Grand Côteau 79, 82
Coulée 160
Gray's Harbor 156, 258, 261, 264
river 157, 258, 264
Great Bend of the Missouri 101
Great Falls of the Missouri 101, 164, 173, 183, 234
Lake 144
Peninsula, the 286
Plain of the Columbia 142, 160, 228, 250
Green Island 270
river 191, 259
valley 140, 191
Grenville, Point 261, 265
Grizzly Bear creek 79
Lake 122, 216
Gros Ventres Indians 86, 92, 98, 99, 221, 236
camp of the 93
council with the 94
distribution of presents to the heroine 95
heroine 93
principal chiefs of the 93
prominent characteristics of the 93
Grover, Lieutenant Cuvier, U. S. A., detailed 33
at Sauk river 41
explorations from the Missouri to the Lower Columbia 173-176
instructions to 34
on the Red River trail 39
orders to, for his western route to Puget Sound 104
prepares for the survey of the Upper Missouri 114
route from Pike Lake to Fort Union 78, 79
sent on the Dead Colt Hillock line 50
sent to examine the Bear's Paw Mountains 97
incidents of his trip 102-103
sent to Fort Benton, *via* Milk river 87
sent towards the Yellowstone 43

Page.
Grover, Lieutenant Cuvier, U. S. A., starts on his trip to the western parties 104
Guard orders 51
Guemes, Canal de 301
Island 300
Port 300
Guerriere Bay 297
Gulf, Deception 304
De Lara's 303
Georgia 303
Gaston 302
Guthrie, Camp 58
Guts of the Cœur d'Aléne Lake 200
Guyot's tables, computation by 356, 358

H.

Hall, Fort 168, 170, 181
Hale's Passage 302
Hamersly Inlet 289
Hammell, Mr. Augustus, interpreter, account of Cadotte's Pass 101
at the Blackfoot Council 115
Hammond, Point 297
Hancock, Cape 262
Hanson, Point 265
Harbor, Angel's 278
Bullfinch 264
Eagle 287
Gray's 156, 258, 261, 264
Hornet's 301
Long 283
Meares's 268
Quinacarnot 276
Seattle 286, 346
Sebec 285
Steilacoom 289
Suquamish 285
Washington 279
Harrison, Point 264
Hartstene Inlet 290
Island 289
Hautboy Island 301
Hazel Point 285
Heart Mountain 216, 239
Heath Bay 290
Hell-Gate 110, 161, 174, 223, 244
Cañon 121, 211
Fork 172
Pass 247
Ronde 121, 210, 339
river 122, 125, 165, 174, 187, 210, 244, 247
Valley 121, 172, 176, 177, 210, 220
Henry Island 297
Lake 45
Higgins, Mr. S. P., wagon-master 44
High Bank creek 171
Highwood creek 173, 235, 239
Mountains 123, 173, 183, 239
Hilcome, Point 277
Hodges, Lieutenant, H. C., U. S. A., acting quartermaster and commissary 32

Page.
Hodges, Lieutenant H. C., U. S. A. at La Tètè peak ... 192
sent to Fort Steilacoom ... 139
Hoecken, Father ... 161
Holmes's Bay ... 293
Holy Cross, the Point of the ... 278
Hood's Canal ... 159, 257, 284
Hooked Man's creek ... 171
Horary oscillations of the barometers, table of ... 353-354
Horn, Cape ... 155
Hornet's Harbor ... 301
Horse Plain ... 161, 245
Hot Spring ... 180
creek ... 178, 246
Huet, Brother Charles ... 133
Hull's Island ... 297
Hydrography of Washington Territory ... 261-307

I.

Ikes, Mount ... 192
Illustrations, List of ... 29
Incidents with Indians at Fort Benton ... 218, 219
Indians, hostile ... 222, 223
India-rubber boats used in crossing Sauk river ... 45
Inlet, Admiralty ... 257, 280-288
Bertodano ... 279
Budd's ... 290
Caamona ... 282
Carr's ... 289
Case's ... 289
Colicee ... 285
Dahap ... 285
Davila ... 278
Dyes ... 287
Eld ... 289
Hamesly ... 289
Hartstene's ... 290
Ironsides ... 297
Lara's ... 303
Martyrs, of the ... 266
Sejachio ... 277
Three Wasp ... 297
Totten ... 289
Inskip Bank ... 290
Instructions to Governor Stevens ... 31
Instruments ordered ... 32, 352
Introduction ... 13
Ironsides Inlet ... 297
Isfuat Bay ... 277
Iskodewabo river ... 229
Island, Allan ... 300
Anderson ... 290
Bainbridge ... 287
Barnes's ... 298
Bellevue ... 297
Blakely ... 298
Blake's ... 288
Blunt's ... 272
Bonilla ... 272
Burrows ... 300
Caamano ... 293

Page.
Island, Carrassco's ... 280
Chachamicah ... 280
Chauncy's ... 298
Cone ... 301
Craven ... 283
Cypress ... 301
Decatur's ... 298
Deception ... 293
Destruction ... 266
Duck ... 298
Duntze ... 289
Elisa's ... 302
Fidalgo ... 300
Fisgard ... 289
Flat Top ... 297
Foost ... 298
Fox ... 290
Freemann's ... 297
Gedney's ... 292
Gordon ... 298
Gourd ... 298
Green ... 270
Guemes ... 300
Hartstene ... 289
Hautboy ... 301
Henry ... 297
Hull's ... 297
James ... 298
Jones ... 297
Ketron ... 290
Kittson ... 290
Lawrence ... 300
Lopez ... 295, 298
Lummi ... 302
MacLaughlin's ... 302
Maury's ... 288
McDonough's ... 163, 293
McNeil ... 290
Minor ... 272
Morse's ... 297
Neeah ... 277
Obstruction ... 298
Orcas ... 297
Patos ... 297
Pearl ... 297
Perry's ... 300
Protection ... 279, 296
Rock ... 301
Rodger's ... 297
Rosario ... 289
Sack's ... 300
San Juan ... 296, 297
Saturna ... 294
Shaw's ... 298
Skip Tack ... 297
Smith's ... 271
Sorrow ... 266
Spieden's ... 297
St. John's ... 296
Strawberry ... 301

Page.
Island, Stuart 297
Tatooche 267, 269
Vancouver's 158
Vashon's 288
Vendovi 301
Waadda 276
Waldron 297
Whidby's 291
Wyadda 277
Young 300
Isothermal Chart, observations on the 314–319
lines 314
Itineraries of 1853:
St. Louis to Pike Lake 35–50
Pike Lake to Côteau du Missouri 50–71
Côteau du Missouri to Fort Union 71–88
Fort Union to Fort Benton 88–100
Fort Benton to Bitter Root river 118–130
Bitter Root river to Fort Walla-Walla 130–154
Fort Walla-Walla to Puget Sound 154–156
Itineraries of 1855:
Walla-Walla to Bitter Root Valley 196–210
Bitter Root Valley to Fort Benton, and return to Olympia 210–226

J.

Jacques river 61, 79, 84
James Island 298
river 62, 79, 84, 233
bridge crossing of 333
Jefferson Fork 169, 171, 181, 234, 238, 247
river 168, 170, 172
Jekelfaluzy, Mr. A., aid 33
discharged 47
Jessie, Lake 58, 60, 84
herds of buffalo near 59
Jocko river 128, 164, 178, 220, 245
route from the, to the Big Blackfoot 128
John Day's river 257
Jones's Island 297
Judith Mountains 123, 239
river 123, 174, 218, 220, 238
Julius Mountain 96

K.

Kalispelum, Lake 246
Kamas Prairie creek 170, 246, 252
of the Flatheads 187, 211
Prairies 178, 199, 200
Kamash Prairies 180
Kamiakan, Yakima Chief 139, 223
Kansas river, mouth of the 80
Kapyah creek 197
Karishon river 229
Kashu Kuddil Point 277
Kathlamet 157, 195
Kayiyou river 184
Kearney, Fort, temperature at 319
Kelisut Channel 283
Kellum's Lake 285

Page
Kellum's Lake, Isthmus of 287
Kelp-fields 271
Ketelas Plain 255
Kettle Falls 159, 162, 251
Ketron Island 290
King Mountain 185
Kitchelus, Lake 141, 167, 194
Kittson, Mr 55
Island 290
Kle-allum, Lake 141, 166
Klikitat Indians 139
Pass 138, 194
river 138, 256
Knee, the 112, 239
Koikla, Point 277
Kooskooskia river 165, 180, 198, 252
Valley, climate of 327
Koutenay Indians 209
Mountains 228
river 178, 179, 246, 252
ores on the 254
Ksitkas, Lake 345

L.

Lake Amelia 36
Bad Water 111
Bell's 52
Big Stone 229
Bow 185
Calhoun 39
Chelan 255
Chief Mountain 185, 236
Clark's 178
Cœur d'Aléne 135, 175, 187, 200, 201, 253
David 45
Devil's 232
Elbow 52
En-chush-chesh-she-luxum 150
Flathead 132, 164, 178, 246
Great 144
Grizzly Bear 122, 216
Henry 45
Jessie 58, 60, 84
Kalispelum 246
Kellum's 285
Kitchelus 141, 167, 194
Kle-allum 141, 166
Ksitkas 345
Lightning 46
Market 170
Miniwakan 37, 232
Mountain 301
Mowee 345
Never Freezing Water 150
Nooknoo 163, 167
Otter Tail 229
Pah-ka-kee 219
Pakokee 111, 115
Pend d'Oreille 109, 135, 175, 246, 254
Pepin 35

Page.

Lake Pike 49
 Prairie 118
 Quinaiutl 258
 Ramsey 46
 Rootham 255
 Sandy 229
 Stanley 47
 Superior 228
 Traverse 78, 83, 229, 231
 Unlucky Water 219
 White Bear 48
 Winnipeg 226, 229
Lakes along the Côteau du Missouri 234
 between the Missouri and the Columbia Plains 253
Lambert, Mr. John, topographer 33
 sent to Red river 53
Lambert river 48
Lame Bull, Piegan Chief 114
Lander, Mr. F. W., civil engineer 33
 instructed to examine the Shyenne river 56
 instructions to and operations of 33-36
 sent from Fort Walla-Walla to Fort Steilacoom 154
 sent to examine the Bear's Paw Mountains 97
 incidents of his trip 102, 103
 sent to examine the Butte Maison du Chien and the Côteau du Missouri 68
 sent to Mouse river and the Yellowstone 76
 sent to Sauk Rapids and thence westward 37
 singular adventure on his trip to Dead Colt Hillock 55
 starts for Chippewa river 50
 starts for Cypress Mountain 106
 tour from the Marias river to Fort Owen 122
Lander's Fork 213, 223, 339
Lansdale, Dr. R. H., Indian Agent 128, 218
 left in charge of the Flathead Indians 223
Lapwai 166, 225
 climate of 327
Laramie, Fort, temperature at 319
Lara's Inlet 303
La Tête peak 191
Lawrence Island 300
 Point 297
Lawyer, Nez Percés Chief 198
Leadbetter Point 262
Leaf river 228
Le Bombard, Alexis, engaged as guide to the Yellowstone 67
L'Eau qui Court 81
Legends of McDonald's leap 145
Lewbough, Point 277
Lewis and Clark's Pass 122, 183, 186, 214, 248
Lewis Fork of the Columbia 170
Lightning Lake 46
 the country around 48
 Neck 79
Lignite at Milk river 114
 at Miry river 82
 at the River of the Lakes 86, 233
 at the Three Buttes 112
Limestone formation near the Shyenne river 57, 83

Page.

Little Rocky Mountains 236
 Blackfoot Fork 124, 244
 Pass 165, 247
 river 165, 176
 Valley 177
 Dalles 159
 Dog, Piegan Chief 106, 114, 218
 Falls, bridge crossing at the 332
 Muddy river 82, 88, 233
 Prickly Pear creek 176, 177, 238
 Soldier, Gros Ventres 92
 Thunder, Assiniboine Chief 73
 Water river 129
Logan, Dr. T. M., on the climate of Sacramento 328-330
Long Harbor 283
Looking Glass, Nez Percés Chief 225
Lopez Island 295, 298
Loring, Cantonment 170
Lou-Lou Fork 180
Low Horn, Piegan Chief 114, 117
Ludlow, Port 283
Lummi Island 302
 Peak 302
 river 258

M.

Macedonian Crescent 298
Macfeely, Lieutenant R., U. S. A., arrives at Fort Benton 108
 return trip to the Dalles 155
MacLaughlin's Island 302
Madison Fork 234, 238
 Port 287
Mageau, Brother 161
Maginn, Brother 133
Magnetic observations at Camp Guthrie 58
Maison du Chien 62, 68, 333
Maple river 57, 179, 231, 246
Marcy, Camp 49
Marias Pass 104, 106, 128, 178, 185, 186, 237, 246, 248
 river 98, 101, 103, 107, 112, 122, 184, 186, 188, 219, 237
Market Lake 170
Marrowstone Point 283
Martinez Point, the Island of 270
 Punta de 269
Martires, Enseñada de los 266
 Punta de los 265
 Rio de los 266
Martyrs, Inlet of the 266
 Point of the 265
Matia Group 298
Maury's Island 288
Mauvaises Terres 82, 104, 106, 123, 174, 217, 220
McClellan, Captain George B., U. S. A., detailed 32
 exploration of the Cascades 137, 138
 sent down the Sound 158
 incidents of his trip 163
McClelland, Camp 55
McDonald, Mr 145
McDonald's leap 145
McDonough's Island 163, 293

	Page.
McKenzie, Fort	106
McNeil Island	290
Meares's Harbor	268
Mecena Point	277
Medicine Lodge creek	170
river	237
Menatrie, Father	161
Mendocino, Cape	268
Menoc, Indian hunter	43
Meteorological observations at Camp Guthrie	58
lost	188
Register.—(Appendix)	13
Meteorology	307–332
Methow river	142, 143, 255
Metsik, Indian hunter	220
Middle Point	293
Milk river	92, 97, 101, 103, 114, 173, 185, 188, 218, 236, 237
geographical position of the mouth of	90
Valley	90, 111, 114, 219, 237
water about	97
Mill river	147, 255
Miniwakan Lake	37, 232
Minne-ha-ha	39
Minnesota, fertility and soil	229, 230
river	228
wagon road communication	230
Minor Island	272
Minter, Mr. Joseph, assistant engineer	32, 137
Miry river	82
Mission, Atahuane	139
Chemakane	147, 201
Cœur d'Aléne	133, 187, 197, 201, 224
Pend d'Oreille	161
St. Ignatius	128, 161
Whitman's	152
Mississippi river	226, 228, 332
character from St. Anthony to Sauk Rapids	40
obstructions to navigation	228
railroad crossings of the	36
tributaries to	228, 229
Missouri river	90, 123, 164, 171, 173, 176, 183, 186, 218, 220
character at Fort Benton	101
described by Lieutenant Donelson	80–82
Great Falls	101, 164, 173, 183, 234
mountains near the	124
muddy character of the	101, 235
navigation of the	235, 236
source and tributaries	226, 227, 234, 236
survey of, by Lieutenant Grover	173
Moffett, Mr. Joseph F., meteorologist	33
energetic performance of duty as lieutenant	52
Mohen, Flathead chief	125
Mojos, Enseñada de	226
Huerto de	267
Mo-ka-un river	185, 186, 219, 236
Mone-e-kis	186
Monroe, Mr	126
Moore's Bluff	290
Moose Island Lakes	78
Moragné, Louis, settlement of	197
Morros, Las dos Islas	300
Morse's Island	297
Mountain men	221
Mount Adams	135
Baker	306
Constitution	296
Erie	300
Ikes	192
Olympus	262
Rainier	138, 191, 290
St. Helen	138
Mouse river and valley	84, 233, 333
Valley, adaptation to settlement	233
Mowee, Lake	345
Mowry, Lieutenant S., U. S. A., meteorologist	32
Mud Flat	290
Mountain	191
Mule breaking	36
Mullan, Lieutenant John, U. S. A., detailed	33
explorations south of the Blackfoot river	168–172
sent to the Flathead camp	105
summary of operations	178–183
trip from the Bitter Root river to Fort Benton	176–178
trip from Fort Benton to Flathead camp, and thence to Fort Owen	123–125
Muscle Shell river	123, 218, 220, 235, 238

N.

Nachess Pass	139, 154, 156, 158, 188, 190, 255, 259
climate of	312
river	139, 192, 255
Narrow creek	150
Narrows, the	288
Nasal creek	263
Naysal river	156
Nebraska, climate of	319–326
Neeah Bay	158, 276
Island	277
Ne-hoi-al-pit-quu river	144, 159, 256
Neuksack river	258
Never Freezing Water Lake	150
Newaukum river	258
New Dungeness Bay	278
Roads	278
Newell, Point	277
Nez Percés Indians	108, 131, 166, 181, 199, 220, 223
trails	248
Nickolowan Point	285
Nicollet's description of the Côteau des Prairies	231
Niseo, Point	268
Nisqually, Fort	290
Plains	190
river	191, 194, 258, 290
Nooknoo, Lake	163, 167
No-Point, Point	287
North Point	264
Nunez Gaona, Puerto de	276

O.

Page.

Oak Bay ... 283
Obstruction Island ... 298
Officers of the Exploration, List of ... 33
Okinakane, Fort ... 142, 144
river ... 144, 250, 255
Oksut, the ... 239
Olympia ... 156, 159, 166, 188, 189
Olympus, Mount ... 262
Ontario Roads ... 298
Orcas Island ... 297
Orchard, Port ... 287
Orders for military rank in the expedition ... 43
Osakis river ... 41
Osgood, Mr. Isaac F., disbursing agent ... 33
sent to the Dalles ... 154
Otter Tail Lake ... 229
Ouhi, Yakima Chief ... 141
Owen, Mr ... 109
Fort ... 122, 172, 175, 181, 186, 223

P.

Pa-at-ta-ta creek ... 197
Pacha, Flathead Chief ... 125
Pacheco, El Canae de ... 302
Isla de ... 302
Pack river, bridge crossing of ... 340
Padilla Bay ... 300
Pah-ka-kee, Lake ... 219
Painted Wood creek ... 77
Pakegon Falls ... 229
Pakokee Lake ... 111, 114
Palassois, Flathead Chief ... 125
Palûx river ... 156
Panther Hill ... 91
Park Pass ... 290
Partridge, Point ... 283
Pass, Big Hole ... 243, 247
Blackfoot ... 132, 183
Cadotte's ... 101, 175, 183, 186, 216, 222, 247
Cœur d'Aléne or Stevens's ... 132, 179, 248
Columbia river ... 346
Hell-Gate ... 247
Klikitat ... 138, 194
Lewis and Clark's ... 122, 183, 186, 214, 248
Little Blackfoot ... 165, 247
Marias ... 104, 106, 128, 178, 185, 186, 246, 248
Nachess ... 139, 154, 156, 158, 188, 190, 255, 259
Snoqualmoo ... 156, 158, 188, 194, 259
Yakima ... 167, 192, 194
Passage, Agatha's ... 287
Dana's ... 289
Deception ... 291, 293
Hale's ... 302
Peal ... 290
Pickering ... 290
Saratoga ... 293
Passes between the Missouri and Columbia Plains ... 247–250
Pa-ta-haha creek ... 197

Page.

Patos Island ... 297
Peace river ... 226
Peal Passage ... 290
Peapod Knol Island ... 298
Pearl Island ... 297
Pearson, Mr., expressman ... 210, 220
Peluse Indians ... 108, 151, 199
river ... 108, 151, 187, 199, 200, 201, 252
falls of the ... 151
Pembina carts ... 43, 86
Pend d'Oreille Indians ... 109, 124, 165, 209, 223
claims of the ... 118
Lake ... 109, 135, 175, 246, 255
Mission ... 161
Penguin Bay ... 300
Peninsula of Roberts' Point ... 304
Pennis Cave ... 158
Penn's Cove ... 293
Pepin, Lake ... 35
Percival Group ... 297
Perry's Island ... 300
Pickering Passage ... 290
Piegan Indians ... 106, 114
Piegan's Tear ... 119
Pierce, Camp ... 36, 53, 83
Pierre, Fort ... 81
Pike Lake ... 49
Pinnacle Rock ... 270
Pisko river ... 255
Pisquouse river ... 142, 250, 255
Plante, Antoine, guide ... 108
Plateau between the Missouri and Mouse rivers ... 85
du Missouri ... 84
Platte river, mouth of ... 80
Point Allan ... 293
Ariel's ... 284
Baadah ... 277
Bastion, of the ... 265
Brown ... 265
Bouilla ... 270
Challam ... 279
Colville ... 298
Conception ... 266, 268
Defiance ... 288
Dinsey ... 297
Edmund ... 286
Francis ... 302
Gordon ... 290
Grenville ... 261, 265
Hammond ... 297
Hanson ... 265
Harrison ... 264
Hazel ... 285
Hilcome ... 277
Holy Cross, of the ... 278
Kashu Kuddil ... 277
Koikla ... 277
Lawrence ... 297
Leadbetter ... 262
Lewbough ... 277
Marrowstone ... 283

Page.

Point Martyrs, of the 265
Mecena 277
Middle 293
Newell 277
Nicholowan 285
Niseo 268
No-Point 287
North 264
Partridge 283
Roberts 286
San Rafael 304
South 264
Takutska 285
Thompson 297
Toke 262
Village 277, 288
West 286
Whitehorn 304
William 302
Williams 293
Wilson 276, 280, 282
Polatkin, Spokane Chief 224
Pomme de Terre river 51
Pope, Captain 46
Poplar river 82, 90
Porcupine river 90, 218
Port Blakely 287
Discovery 279
Gamble 284
Gardner 293
Guemes 300
Ludlow 283
Madison 287
Orchard 287
Scarborough 277
Susan 292
Townsend 158, 280, 283
Washington 279
Possession Sound 291
Poverty Cove 277
Prairie Chippewa Indians 65
dogs, villages of 91
fire 105
Lake 118
of the Knobs 121, 211
Prairies between the Mississippi and Red rivers 54
Prickly Pear creek 124, 165, 176, 238, 244
Priest's Rapids 251
Protection Island 279, 296
Prune creek 220
Pteh-num 255
Puerto Alara 268
Puget Sound 142, 155, 158, 194, 228, 257, 288
Pu-pu-mux-mux, Walla-Walla Chief 108, 153, 154, 223
Puyallup river 140, 191, 258, 286
Pyramid Butte 187, 198

Q.

Quadra, Puerto de 280
Queenhithe Bay 266
Quenchenas Entrance 282
Quillatose, Peluse Chief 199

Page.

Quimper's Bay 278
Quinacarnot Harbor 276
Quinaiutl Lake 258
river 159, 258

R.

Rabbit river 52, 79
Race Rocks 271
Railroad grades on several roads 190
crossings of the St. Regis de Borgia river 203, 204
Estimate 348–351
Report 332–348
St. Paul to Bois de Sioux 332
Bois de Sioux to Fort Union 333
Fort Union to Milk River crossing 334
Milk River crossing to Fort Benton 335
Fort Benton to Cadotte's Pass 336–340
Hell-Gate crossing to the Spokane. 340
Hell-Gate crossing to Bitter Root crossing 340–342
Bitter Root crossing to entrance of tunnel through the Cœur d'Aléne mountains 342
Tunnel at Stevens's Pass of Cœur d'Aléne mountains 343
Tunnel to Cœur d'Aléne Mission 343
Cœur d'Aléne Mission to Columbia river crossing 344
Columbia river crossing to Seattle 345–347
Breckinridge to Seattle 347
sites at Hell-Gate 210
Rainier, Mount 138, 191, 290
Ramsey, Governor 46
Lake 46
Ranger's Prairie 167, 259
Rattlers, the 119, 183, 222
Ravalli, Peré 133, 201
Red Butte creek 170
River Hunters 55, 64
encampment of 65
of the North 84, 227
tributaries to 231
settlements 66
Valley, temperature of 314
agricultural products of 325, 326
Wolf's Ground 197, 253
Women, the Bay of the 277
Remenyi, Captain A., astronomer 33, 37
discharged 47
Rice creek, railroad crossing at 332
Ringgold's Channel 299
Riviere des Lacs 84
River of the Lakes 71, 233
Robert's Point 286
Peninsula of 304
Robie, Mr. Albert H., engaged 196
Rock Islands, the two 300
Rocky Mountains, arable lands 249
Lewis and Clark's description 242
passes 247, 249
region 242
the great backbones of the 228–243

Page.

Rocky Mountains, the great semicircle formed by the divides of the 243
Rodd Bay 290
Rodgers's Island 297
Rook creek 257
Rootham, Lake 255
Rosario Island 289
Strait 299
Ross's Hole Mountain 247
Prairie 169, 247
Rapids 251
Rotten Belly, Crow Chief 106
Rocks 106
Roulet, Mr 55
Roxas, Enseñada de 277
Rum river 40, 229
railroad crossing at 332
Running Fisher, Indian Chief 96, 98
Russia, agricultural products of 324
Steppes of 320
Ryder Channel 290

S.

Sack's Island 300
Sacramento, climate of 328, 330
Salmon Creek river 212
river 252
Trout creek 339
Salt lakes near Cypress Mountain 114
near Shyenne river 67
on the Côteau du Missouri 233
marshes 84
Samish river 158
Sammamish river 286
Sandy creek 233
Lake 229
San Juan Island 296, 297
Rafael Point 304
Santa Cruz, Puerto de 278
Rosalia, Peak of 262
range 262
Saratoga Passage 293
Saskatchawan river 185, 219, 226, 237
Satsop river 159, 258
Saturna Island 294
Sauk Rapids 40, 228
bridge crossing at 332
river 36, 45
Sault St. Mary's Canal 227
Saxton, Lieutenant Rufus, U. S. A., detailed 32
at Vancouver 107
incidents of his trip from Vancouver to Fort Benton 107–111
instructions to 32
leaves Fort Benton for Washington City 117
trip from St. Mary village to Fort Benton 110, 111
voyage down the Missouri to Fort Leavenworth 174
Scarboro' Shoals 290
Scarborough, Port 277
Scattering creek 122

Page.

Seattle 158, 167
Harbor 286, 346
Sebec Harbor 285
Se-cule-eel-qua creek 150
Sergeant's Hill 81
Setting Squaw, Indian Chief 96
Shaw's Island 298
Shoalwater Bay 156, 158, 258, 262
Cape 262
Shonkee creek 123
Shonkin creek 239
Shyenne river 58, 79, 83, 231
crossing the 55
Sibley 80
Hon. H. H., Governor of Minnesota 37
Simpson, Captain J. H., acknowledgments to 36
Sir George, of Montreal 32
William, packmaster 44
Sinclair's Bay 301
Sin-sae-ghi-aul-tan creek 150
Sioux river 81
Sisters, the 298
Skagit Head 158, 285
river 158, 163, 258
Skamish river 140, 191
Skip-Tack Island 297
Skokomish river 260
Skookum-Chuck river 258
Skywhamish river 163
Slawntehus Valley 148
Slyotze, Peluse Chief 200
Smith's Island 271
river 124, 239
Snae-peene creek 150
Snake river 108, 151, 160, 169, 170, 180, 198, 227, 251
navigability 252
tributaries 252
Snelling, Fort, meteorology of 313, 315
Snohomish river 163, 258, 293
Snoqualmoo Falls 163, 167, 259
Pass 156, 158, 163, 166, 188, 194, 259
climate of 312
river 163, 194, 259
Snow as an obstruction to the Railroad Route 311–314
at Clark's Fork 313
in the Nachess Pass 312
in the Snoqualmoo Pass 312
in the passes of the mountains, Blackfeet Indians' reports upon 100
Sohon, Mr. Augustus, barometrical observations 196–218
Solane, Punta de 302
Sometknu Falls 159
Sorrow, Island of 266
Soto, Enseñada de 277
South Point 264
Spieden's Island 297
Spokane House 136, 148
Indians 109, 134, 136, 148, 224
Plain 143
river 109, 160, 201, 225, 252
bridge crossing of 340
falls 135

	Page.
Spokane Valley	254
Springs, the	98
Square Hill	98
St. Ange, steamer	87
Stanley, Mr. J. M., artist	33
takes daguerreotypes of Indians	87, 103
sent to examine the Bear's Paw Mountains	97
incidents of his trip	102, 103
incidents of his trip to Milk River Valley and Cypress Mountain	114, 115
sketching Sergeant Simpson cooking	127
description of the Falls of the Peluse	151
Lake	47
St. Anthony	228
the country around	40
Falls	36, 228
bridge crossing at	332
St. Charles	80
St. Croix	229
Steilacoom	158, 163, 190
Fort	139, 190
temperature at	312
Harbor	289
St. Regis de Borgia river	203, 205, 342
Strobel, Mr. Max, aid	33
Strong's river	157
Stuart Island	297
Sturgeon Bank	305
Sucia Group	297
Suckley, Dr. George, surgeon and naturalist	33
natural history collection from Lake Amelia	36
instructed to follow Lieutenant Grover's trail	43
Camp on the Côteau du Missouri	70
sent to Mouse river and the Yellowstone	76
instructions at the Pend d'Oreille Mission	146
trip from the Pend d'Oreille Mission to Fort Colville	161, 162
Sun river	118, 122, 173, 176, 183, 186, 216, 222, 237, 337
Forks of	216
Gates of	243
Valley	118, 237
Superior City	228
Lake	228
Suquamish Harbor	285
Head	284
Susan, Port	292
Swan river	36, 246
Sweet Grass Hills	97

T.

	Page.
Table of abnormal corrections	355
average cold at different localities	307
computations	356, 358
contents, general	9
distances measured by the odometer	193
greatest cold	303–311
heights and distances.—(Appendix)	3
horary oscillations	353, 354
Table of mean temperature of stations between the St. Lawrence and Puget Sound	318
temperatures at mountain passes	311
Tahk Plain	145
Takutska Point	285
Tatooche, Cape	269
Island	267, 269
Teenat-pan-up creek	200
Tete de Côteau	232
Teton river	101, 103, 105, 113, 122, 184, 217, 222, 237, 337
Valley	99, 117, 186, 217, 222, 237
Thompson Cove	290
Point	297
Thompson's Prairie	110, 175, 247
Three Bears, Piegan Indian	100
Buttes	97, 111, 114, 218, 236
Wasp Inlet	297
Tinkham, Mr. A. W., civil engineer	33
instructions to	33, 38
starts for Chippewa river	50
sent to Bald Hillock creek	61
joins the Expedition again	65
sent to White Earth river	77
sent to reconnoitre the Three Buttes	105
incidents of his trip	111–113
sent to the Upper Valley of Sun river	120
sent to the Marias Pass	128
explorations from the Jocko river to Seattle	163–167
Tobacco river	179
Toke Point	262
Totten Inlet	289
Touchet river	152, 166, 181, 197, 255
Valley	197
Townsend Port	158, 280, 283
Traveller's Rest creek	121, 180
Traverse, Lake	78, 83, 229, 231
Treesald Cove	285
Trunk, the	112, 239
Tukanon river	166, 181, 197, 255
Tutusi, Isla de	270

U.

Ucunas Bay	278
Umatilla river	108, 257
Union, Fort	83, 85
Unlucky Water, Lake	219
Upper Chehalis river	194
Useless Bay	265, 285

V.

Vancouver	137, 155, 162
Vancouver's Island	158
Vashon's Island	288
Vendovi Island	301
Victoria	158
Victor, Flathead Chief	127, 128
Village Point	277, 288
Viti Rocks	301
Voyageurs, Canadian	40, 42

W.

Page.
Waadda Island — 276
Waldron Island — 297
Walla-Walla, Fort — 108, 152, 181, 187, 190
meteorology — 317, 327
river — 108, 160, 166, 252
tributaries — 255
Valley — 151, 189, 197, 225, 252
Wanoochee river — 258
Washington, Camp — 148
Harbor — 279
Port — 279
Sound — 271, 295
Territory, climate of — 326-331
Hydrography of — 261-307
Washookat river — 138
Washougal river — 258
Watab river — 36
Weather Beach — 262
Wellamd Canal — 227
Wenass river — 139, 255
Valley — 193
West Point — 286
Wenatshapam — 142, 255
Whidby's Island — 291
White Antelope, wife of Eagle Chief — 92
Bear Lake — 48
Crane, Blood Indian — 100
itinerary from Fort Benton to St. Mary's village — 100, 101
death of Sapper — 78
Eagle, Gros Ventres Indian — 92
Earth river — 76, 81, 233
Whitehorn, Point — 304
Page.
White Man's Horse, Indian Chief — 89
river — 140, 259
Salmon river — 138, 258
Whitewater river — 191
White Wood Lakes — 68
Whitman's Mission — 152
Wild Rice river — 54, 79, 83, 231
bridge crossing of — 54, 333
Wilkie, Governor — 65, 67
Willamette Valley — 194
William, Fort — 229
Point — 293
Williams, Point — 302
Williamson's Rock — 300
Willopah river — 156, 358, 263
Willow creek — 257
Wilson, Point — 276, 280, 282
Wind river — 138, 226
Winnebago Indians, encampment of — 40
Winnipeg, Lake — 226, 229
Wisdom river — 168, 172, 244, 246
Wolf's Lodge Prairie — 134, 224
Woman's Breast — 217
Wyadda Island — 277

Y.

Yakima Indians — 139, 150
Pass — 167, 192, 194
river — 139, 160, 255
tributaries — 255
Valley — 140, 166
Yellowstone river — 171, 220, 226, 232
mouth of the — 234

GENERAL RAIL-ROAD PROFILE, FROM MILK RIVER CROSSING, VIA CADOTT'S, COEUR D'ALENE & SNOQUALMOO PASSES, TO SEATTLE.
CADOTT'S PASS.
LEWIS & CLARK'S PASS.
FROM MILK RIVER CROSSING VIA LEWIS & CLARK'S PASS, TO JUNCTION WITH MAIN ROAD.
PROFILE OF THE ROUTE TRAVELLED BY Mr DOTY, FROM FORT BENTON, VIA SUN RIVER, ALONG THE EASTERN BASE OF THE ROCKY MOUNTAINS.
Horizontal Scale 1:600,000. Distortion 10 Times.
COEUR D'ALENE PASS.
SNOQUALMOO PASS.
FROM MILK RIVER CROSSING, VIA CRACON DU NEZ, TO FORT BENTON.
ROUTE TRAVELLED OVER FROM MILK RIVER CROSSING TO FORT HAMILTON.
ROUTE TRAVELLED OVER FROM COEUR D'ALENE MISSION TO ANTOINE PLANT'S HOUSE
FROM COEUR D'ALENE MISSION, VIA SOUTH OF LAKE TO JUNCTION WITH MAIN LINE.
GENERAL PROFILE FROM THE MOUTH OF JUDITH RIVER, VIA LEWIS & CLARK'S & COEUR D'ALENE PASSES, TO CAMP STEVENS NEAR NEW FORT WALLAWALLA.
EXPLORATIONS AND SURVEYS
FOR A RAIL ROAD ROUTE FROM THE MISSISSIPPI RIVER TO THE PACIFIC OCEAN,
WAR DEPARTMENT.
ROUTES NEAR THE 47TH AND 49TH PARALLELS
PROFILES
From Explorations and Surveys made under the direction of the
HON. JEFFERSON DAVIS, SECRETARY OF WAR.
BY ISAAC I. STEVENS.
GOV. OF WASHINGTON TERRITORY
1853-4-5.
Horizontal Scale 1:1200,000.
Vertical Scale 30,000.
Distortion 40 Times.
Statute Miles
10 5 0 10 20 30 40 50 60 70 80 90
Lith. of Sarony Major & Knapp, 449 Broadway N.Y.

H. R. EX. DOC. No. 56–36th CONG. 1st SESS.

EXPLORATIONS AND SURVEYS FOR A RAIL ROAD ROUTE FROM THE MISSISSIPPI R. TO THE PACIFIC OCEAN.
WAR DEPARTMENT.
Routes near the 47th and 49th Parallels
MILK R. TO THE CROSSING OF THE COLUMBIA R.
From Explorations & Surveys made under the Direction of the
HON. JEFFERSON DAVIS, SECRETARY OF WAR,
BY ISAAC I. STEVENS
GOV. OF WASHINGTON TERRITORY
1853 - 4 - 5
STATUTE MILES
1:600000.
MISSOURI RIVER
COLUMBIA RIVER
YELLOWSTONE RIVER
Fort Benton
Fort Colville
Fort Okinakane
Old Fort Wallawalla
New Fort Wallawalla
LAKE PEND D'OREILLE
FLATHEAD RIVER
DIVIDING RIDGE OF THE
Common hunting ground of Western and Blackfeet Indians
Jefferson's Fork
Madison's Fork
Gallatin's Fork
Twenty five yards R.